

Chapter 1

Introduction to SDN and NFV

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ABSTRACT

Software defined network (SDN) and Network function virtualization (NFV) are the two new networking paradigms changing the way traditional networks work. SDN works on the concept of centralization so that all the decisions related to controlling the networks is done in a centralized place in a centralized manner. To provide a centralized control, SDN decouples the control plane and data from the traditional routing devices to take it in the centralized position. The data plane is still intact with the routing devices, but they now become mere forwarding devices and the decisions are made at the centralized place called the controller. The controller is basically the x86 server that is connected to the forwarding devices and communicates with them for all control decisions such as routing. NFV is based on virtualization of network functions in the form of software running over a high end server. This kind of virtualization helps in easy setup of networks as well as easy migration.

INTRODUCTION

Information and Communication technology (ICT) has seen evolution of new technologies and trends such as mobile and cloud computing, social media and IOT. These new technology requires ubiquitous accessibility, high bandwidth and dynamic management (Xia, Wen, Foh & Niyato, 2015). The current networking technology seems inept to satisfy these dynamic requirements due to ossification inherited in the traditional one by the use of propriety hardware devices. Software defined network (SDN) and Network function virtualization (NFV) are the two

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new networking paradigms that are changing the way the traditional networks are functioning. These new technologies seem promising in handling the current and future requirements in the ICT. SDN (ONF White Paper 2012) is a technology which works on the concept of centralization to provide centralized decision making for the entire network whereas NFV (NFV-ISG, White paper 2015) is a technology which is based on virtualization to virtualize the network functions (NF). SDN decouples the control plane and the data plane from the traditional networking devices i.e. routers leaving behind data plane intact with the device making them mere forwarding devices following the decision of the centralized controller. The benefit of centralization is to have a centralized information regarding topology which provides easy monitoring and fault tolerance. SDN also provides the network programmability which helps to cope the dynamic nature of today's networks. NFV, on the other hand, is based on virtualization of network functions in the form of software running over high end server. This kind of virtualization helps in easy setup of networks as well as easy migration. The NFV is initiated from the Telecom Service Provider (TSP) so that they can achieve high return of investment i.e. ROI along with a flexible infrastructure where deployment and integration is faster and easier.

This chapter consists of two sections. The first section will cover the SDN definitions, evolution and architecture of SDN along with challenges and future trends. The second section will cover the NFV definitions, evolutions and architecture of NFV along with challenges and future trends.

INTRODUCTION TO SOFTWARE DEFINED NETWORK (SDN)

(Haleplidis, Pentikousis, Salim, Meyer, koufopavlou(2015)) in RFC 7426 describes Software Defined Networks as:

Software-Defined Networking (SDN) refers to a new approach for network programmability, that is, the capacity to initialize, control, change, and manage network behavior dynamically via open interfaces. SDN emphasizes the role of software in running networks through the introduction of an abstraction for the data forwarding plane and, by doing so, separates it from the control plane.

By following the above definition we can deduce the following salient features of a SDN network:

1. Programmable Network
2. Centralized Management
3. Dynamically Configurable Networks

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