"Software Defined Network"(SDN)

Parteeban a/l M Varatharajoo

Foundation in Business School of General and Foundation Studies, AIMST University,
Kedah, Malaysia

Abstract: *This paper explains a b o u t the basic concept of Software Defined Network (SDN). The paper also lists and discuss about the details of two sample products of Software Defined Network. Besides that, this paper also list out the details on the main issues and challenges of Software Defined Network. Finally this paper summarized on the importance and the future of the Software Defined Network in the development of network performance in the business world.*
Keywords: *Software Defined Network, network, software*

I.   Introduction

Software Defined Network (SDN) has received a lot of attention in the recent years as a means of addressing some of the long standing challenges in networking. SDN starts from two simple ideas, one is to generalize network hardware so it provides a standard collection of packet-processing functions instead of a fixed set of narrow features, and the second is to decouple the software that controls the network from the devices that implement it. This design makes it possible to evolve the network without having to change the basic hardware and enables expressing network algorithms in terms of appropriate abstractions for particular applications.

II.   The Basic concept of software defined network

A. Software Defined Network (SDN)

SDN is a framework to allow network support team to automatically and dynamically manage and control a large number of network devices, services, topology, traffic paths, and packet handling policies using high level languages and APIs. The SDN management includes all the network area of provisioning, operating, monitoring, optimizing, and managing FCAPS (faults, configuration, accounting, performance, and security) in a multi-tenant environment.
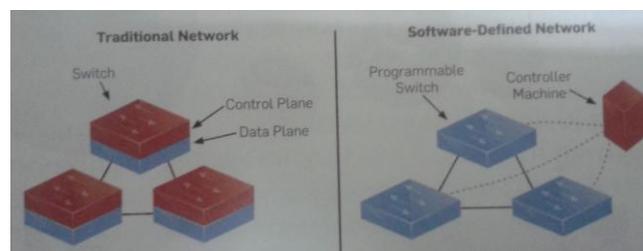

Figure 1. Traditional and Software-Defined Architectures

Figure 1 explains the architectures of traditional networks and Software Define Network. In SDN, one or more controller machines execute a general program that responds to events such as changes in network topology, connections initiated by end hosts, shifts in traffic load, or messages from other controllers, by completing a collection of packet-forwarding rules. The controllers then push these rules to the switches, which implement the required functionality efficiently using specialized network hardware.

B. Concept of Software Defined Network

SDN is one of the technologies that open the data, control, and manages planes of the network. This is to participate more easily in a framework that using an Application Programming Interfaces. Software Defined Networking is a concept to change the traditional integrated networking stack to improve network efficiency and lead to a new network solution.

The SDN enables the network operations to support different kind of services. APIs also supports the development of a new set of network applications and services by a different source, including independent developers and Value added Resellers.
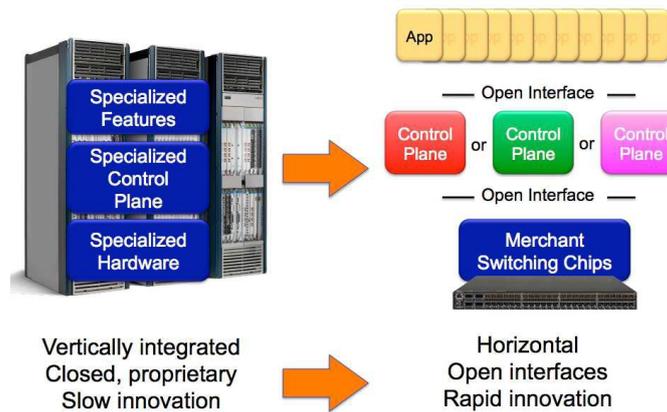

Figure 2. Software Defined Networking

C. Architecture of Software Defined Network

SDN architectures decouple the network control and forwarding functions and also enabling network control to become directly programmable. SDN architecture maintains to be manageable and cost effective. SDN supports under a suitable high bandwidth and efficient applications. In SDN the Open Flow protocol is the basic element for building SDN solutions to better network solution. The network control is straight programmable; this is because, it is decoupled from forwarding functions. The SDN also active by control from forwarding and the IT Team actively adjust the network big traffic flow to meet the needs.

The SDN is managed by using the network capability; it will be centralized in software based SDN controllers that maintain overall of the network, which looks to applications and the policy of the devices as a single and consistent switch. SDN is configured and the network team to manage, configure, secure and optimize network resources very quickly with an automated SDN program.

SDN used as an open standard and it was also implemented through open standards. SDN streamlines the network design and the process which is provided by SDN controllers instead of multiple devices and protocols. Setting foot outside the data center and solve the problems faster means increased productivity for IT employees.

III.   Description of two (2) examples of software defined network Products

In this paper, two examples of Software Design Network product introduced. The details of the product description as below: Cisco ONE Platform Kit is an approach of network programmatic platform in a different technology environment.
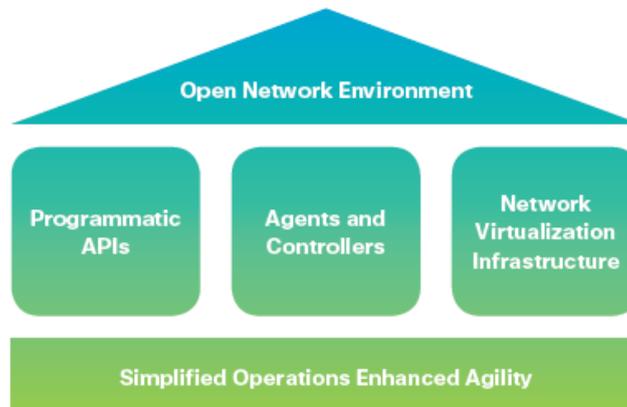

Figure 3. Cisco ONE Architecture

Cisco supports with a lot of programmatic action, including device discovery, management, and routing control. The programmatic interface of Cisco One Platform Kit (Cisco OnePK) gives Cisco and third-party controllers with programmatic access to Cisco. In addition, Cisco OnePK data path APIs allow programmatic access, to modify, extract, and reinsert packets in an active flow.

Figure 4 Cisco ONE Platform Kit reflects

Open Flow support on the Cisco ready controllers and not like as other Open Flow controllers, the Cisco controller provides role based access control, troubleshooting support, topology independent forwarding and the ability to inject synthesized traffic and trace routing.

In this paper also, other examples of Software Defined Network product introduced. Dell Networking Operating System (OS9) delivers a best in class network OS that includes an industry standard command line interface, ensuring that networking staff can immediately be comfortable and productive.

OS9's powerful scripting capabilities leverage industry standard languages and libraries, eliminating the need to learn proprietary languages with immature development environments and toolsets. However, behind the scenes of the familiar and comfortable CLI, OS9 packs a powerhouse of next generation automation, programmability and SDN capabilities.
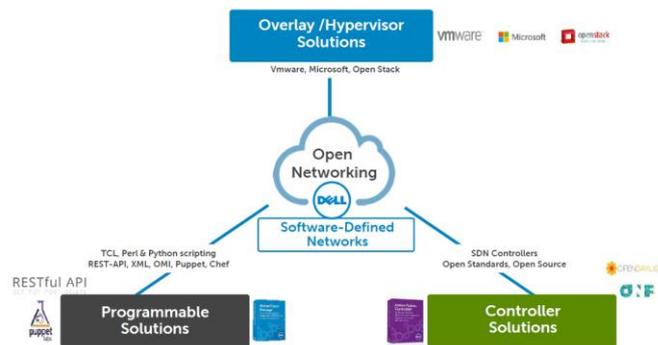

Figure 5. Choice of Software Defined Networking Approach

OS9's powerful scripting capabilities leverage industry standard languages and libraries. It also eliminates the need to learn proprietary languages with immature development environments and toolsets. As the SDN and open networking movements continue to produce rapid innovations in networking management and solutions software, the robust programmability features and open interfaces in Dell OS9 combined with our open networking initiative offers the most adaptable and resilient framework providing the most extensive investment protection available in a networking solution today.

IV. SDN Issues and challenges

SDN holds a great promise in terms of simplifying network deployment and operation. SDN also along with lowering the total cost of managing enterprise and carrier networks by providing programmable network services. However, a number of challenges remain to be addressed. This section focuses on four specific questions arising from the challenges of SDN. The Scalability of SDN and how to enable the Controller to provide a global network view. The SDN Performance vs. Flexibility and how can the programmable switch achieved? Security: How can the Software-Defined Network protected from malicious attack? And finally the Interoperability: How can SDN solutions integrated into existing networks? All the answer for above question still need to be research and study for further strengthen the SDN in network solution globally. However few research results not enough for a positive progress of the SDN. The SDN needs a lot of development and improvement for betterment of the network solution for next technology generation.

V. Conclusion

SDN supports to shorten the operations and integrating network management tasks. It makes the network more approachable to business and institutional needs by coupling the applications with network control. Numerous of the initial efforts with SDN have dedicated on architectural concerns, making it possible to advance the network and develop rich applications. But the progress of this new software bionetwork has also led to the development of fundamental new concepts that exploit the ability to compose network control software on standard servers with a less constrained state distribution model. Finally, we believe the SDN help the IT organization more agility, because they can easily check the network behavior for business needs. The development and research will continue the effort of IT organizations to deploy technologies that allow them to measure and respond to the demands.

References

[1]   Software-Defined Networking: The New Norm for Networks," Open Networking Foundation, White Paper. [Online]. Available: https://www.opennetworking.org
[2]   ITU.T Recommendation Y.1731 OAM Functions and Mechanisms for Ethernet based Networks." [Online]. Available: http://www.itu.int/itudoc/itu-t
[3]   Interface to the Routing System," IRTF Working Group. [Online]. Available:https://datatracker.ietf.org/wg/irs/charter/
[4]   Network   Function   Virtualisation,"   ETSI   Industry   Specification Group.[Online].Available:http://portal.etsi.org/portal/server.pt/community/NFV/367
[5]   R.   Ozdag, \Intel Ethernet Switch FM6000 Series - Software Defined Networking." [On-line]. Available: http://www.intel.co.uk/content/dam/www/public/us/en/documentswhite-papers/ethernet-switch-fm6000-sdn-paper.pdf