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A Research Survey on Software Defined Networking (SDN)

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Abstract- **In today's fast moving world, trend of plug and play software and hardware is increasing and since the cloud is taking over the market there is high usage bandwidth consuming applications and hardware since loud is on internet and gets the applications or hardware connected real time plus having the facility or feature to update data real-time. So high availability and real time data processing paved ways of introducing new concept in network management that is Software Defined Networks (SDN). SDN are designed to curb down the challenge of traditional network. In this paper, we have discussed the advantages of software-defined networks and the challenges plus how they are addressed with this concept plus its scalability and reliability.**

***Keywords*— Software Defined Networks, SDN , Network, Fast Networks**

I. INTRODUCTION

Nowadays everything is moving on cloud that entails a fast and robust internet network that can carry high bandwidth plus server virtualization and interconnected data centers has augment the demand of high speed bandwidth network enormously. Traditional networks are unable to cater this nee and since the decision it takes is packet forwarding from single device on every packet. Moreover the decision plane or networking control plane are considered as single entity on same device and controlling of network is distributed across the network so whenever a new devices is connected from network it takes significant time in order to synchronize itself in the network.

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Today network are based on IP address and every devices in network is recognized by IP this works good with static networks but it would not work fine with virtual network so managing such complex network with legacy network would be time consuming and would not cater the fast and reliable network. Now to address this concern or simplify it administrator must resolve the network infrastructure issues that is contributing to complexity of network.

The traditional network approach doesn't allow the administrator to increase speed of data and efficiency plus it also does not allow programming the networks to meet this fast data networks need plus there is a need of entire network admin team to run and manage the network efficiency.

Quest for fast data networks with improved manageability is increasing rapidly due to certain reason like big data analytics, increase in the usage of mobiles. Virtualization of switches and network devices plus increase in interconnected data centers plus increase in server to server and client communication a need arise to address these challenges by deploying a network that is more reliable robust and efficient.

In order to resolve these challenges software defined network came into existence because it has separate data and control plane so it might be a possible solution to manage network management and its control and provides that ability to program the control plane.

Despite of its entire advantages software defined network

it has certain challenges as well to limit its performance in cloud computing and its implementation in organization. This paper covers majority of the challenges of this technology with causes and possible solutions plus addressing scalability, reliability issues. Resolving these issues might persuade organizations to adapt this technology to make their network management efficient.

II. METHODOLOGY

A. Industry Survey

In order to get the industry feedback, we conducted a comprehensive survey. We have asked the industry professionals to share their plans to implement software-defined network in their organization and highlight the issues that they are facing in case they have implemented this technology. Moreover how this technology is in terms of financials whether it is cost effective or has high one- time cost and low monthly recurring cost as organizations are driven by money so it is quite a significant area in deploying any new technology.

From responses, results were that we found IT professionals are aware of this SDN technology and around 90 % of them agreed that post implementation of this technology their network management become quite easy and efficient and they make changes in the network quite easily comparing from traditional network management. 70% of them do highlight certain issues that they are facing with this technology however they are not that critical that one can consider them as show stopper and 90 % of them agreed that this technology is cost effective and are very impressed by this innovation that it separates data and control plane.

B. Main Points Summary

S No	Main Points
1	Network Virtualization and Software Defined Networking for Cloud Computing
2	Software-Defined Networking: A Comprehensive Survey
3	New Networking Era: Software Defined Networking
4	Scalability of Software-Defined Networking
5	The Road to SDN: An Intellectual History of Programmable Networks

C. Article Extraction

1. *Network Virtualization and Software Defined Networking for Cloud Computing*

SDN will become popular as:

1. Due to Cloud computing that came into existence when virtualization in every computing aspect data storage and data networking become stable.
2. Network virtualization is still not mature enough and many aspect of standard are still being developed and under constant research by many computer literates / professionals plus many are developed in the IEEE lately and Internet Engineering Task Force.
3. One of the Prime developments for managing network efficiently and to increase the ease of network management of data and control plane a new direction had been discovered by the name of software-defined networking. The main innovation in this idea is segregation of data and control planes plus centralized control and standardized APIs of northbound, southbound and east west that will enable plenty of devices to be easily programmed and to do certain functions that will result in ease of management of networks.
4. Open networking forum has defined a standard for southbound API that is open flow.
5. Further working is being carried out on Open AND which is network application that work on the principle of Software defined network that will allow us to carry out partitioning and delivery in cloud and on multi cloud environments.

2. *Software-Defined Networking: A Comprehensive Survey*

The issue with traditional networks is that they are quite complex and difficult to manage reason being that control and data plane are integrated and specific to the vendor another reason being that devices are stick to product and different versions. In other words each set of products have its particular configuration and management interfaces entailing long time durations for producing updates or firmware. These were the reason, which rise network infrastructure issues and casing severe limitations to any creativity in networks plus decoupling of data and control plane plus centralization of network.

Data plane are only for packet forwarding in an efficient manner and programmable packet forwarding devices whereas the control plane would be considered as single entity as controller of network or network operating system.

Application or software that is being implemented or driving controller is getting easy to develop and deployment when comparing it from traditional networks.

Implementation of policies is quite easy to enforce with SDN and represents and represents model in the development and change in network that would create a new network infrastructure.

This paper addresses the overview of the building blocks and the complete concepts and challenges that are being

faced in software defined networks and the efforts that made to address these gaps and it uses a layered approach to divide the concepts or ideas of SDN covering current scenarios and future strategies.

We have compared this new technology with traditional networks and discussed the way it can be used in organization by following a bottom up approach. Paper present a detailed overview eight fundamental face of software defined network problems

1. Hardware Infrastructure
2. Southbound Interfaces
3. Network Virtualization
4. Network Operating System
5. Northbound Interfaces
6. Virtualization using slicing technique
7. Network Programming Language
8. Network Applications

Software defined network has paved ways toward network of next generation moreover it produces innovative research and development environment and encourage advancement in multiple areas including switch and control design plus scalability and its evolution and performance of network architectures and promotion of security.

It's quite evident that Software defined network will continue to excel and witness lot of activities in the years ahead. There are certain areas that entail further research for instance migration path to SDN, extending SDN towards carrier transport networks, realization of the network as-a-service cloud computing paradigm, or software-defined environments (SDE).

3. *New Networking Era: Software Defined Networking*

Due to the fact that traditional networking architecture does not support or compatible with the changing needs of the business that includes

Increase in devices laptops and mobiles, virtualization of machines sun setting the needs to procuring additional hardware and that is more cost effective and high-end automation and highly secure and managing the IoT devices data and big data applications. That are increasing rapidly with the passage of time and high quality with the high range of services so all these problems would be addressed by Software defined network.

This is certain that the existing network is not as much dynamic as Software defined network although it's under research, computer literates around the globe are working to make this technology mature enough to implement it to organizations, and still it's not mature in the current span of time.

It also help in managing certain devices which are being newly introduced plus traditional devices including optical and wireless networks efficiently.

In order to comprehend that Software defined network would play a key role in the years ahead in devising range of technologies we need to give our mind a thought that what Software defined network is providing us or rendering us beside technical advantages.

Software defined network renders give network manage or its users a feel that they are close to network round the clock throughout the year and they would not feel that they are far away from their networks when they are managing their networks therefore it is evident that network would adapt Software defined networks in the years ahead.

A feedback is required from software defined networking community as it's is getting transformed and would put life in this research paper that gets updated by the community or some sort of knowledge base for this technology and would invite reader to join us in this common effort.

4. *Scalability of Software-Defined Networking*

Software defined network has been introduced and has multiple benefits however it has certain concerns as well and one of the major concern is scalability. These concerns are not wreaked by software defined network and are not unique to this technology as shown by research body.

The main challenge is to leverage the benefits and addressing the issues simultaneously and the scale that exists do support or justify this argument and what is being overlooked in this area is the consequence of software defined network on certain other factor that are limited in nature for the network's growth that includes network programming that is a prime area and complexity in managing the networks.

Software-defined networking would be beneficial as it incorporate the level of flexibility that would cater programmable networks plus management of networks with scalability that was failed in traditional networks.

Attempts are being made in a very positive direction from this perspective and are very promising although there are many challenges in it however hopefully or very likely that these challenges would be overcome.

5. *The Road to SDN: An Intellectual History of Programmable Networks*

SDN is programmable network and came into existence with the history that how it's shaped into current state. Initially the programmable networks were considered as active networking and interestingly on doing further research we learned that it adopt many of the ideas of Software defined networks moreover we also learned that it lacked to thing that is clear use case and incremental or progressive deployment path.

Following this era of active networking and lot of research that had been carried out on this topic we have seen its vision or dream or whatever that was in minds

transformed into pragmatism by segregating the control and data plane to make it easier for every organization to manage their network easily and efficiently. Its focus was on figuring out the better ways to route data that is narrowed form of vision when comparing it from previous research on active networking.

Eventually or ultimately, the open flow and network operating system made a balance between these two approaches that are what we dreamed and what is happening practically. The proved the control of network over wide ranges of applications that were still relied on capabilities or competencies of switches.

The options that make the existing switches hardware very appealing to the vendors is it backward compatibility that would make them compete the growing market in data networks. Vision with practical approach and strategies that is pragmatic for widespread adoption would gain attraction when software defined network leverage virtualization of networks.

Software defined network would continue to develop and history has made us learned a lot of lesson or best practices. This technology life is contingent on its utilization or adaptation that is very likely from the feature it renders that it would live and its has certain indications. That shows that it provide one window solution to all your network needs or issues its worth remembering it's just a simple tool that would ease your network management and real time depict the issues that would be addressed timely.

Software defined networks has very strong and bold I would say vision which entails us to have out of box thinking about the ways to program network more efficiently without being distracted by the constraints and limitations of existing technologies.

Instead of just devising software defined network's applications with open flow protocols, we really need to give some thought of how we can mange network efficiently from this technology and what type of controls we can develop to control the network easily and balance the vision with practical strategy for implementation of this technology.

III. FIGURES

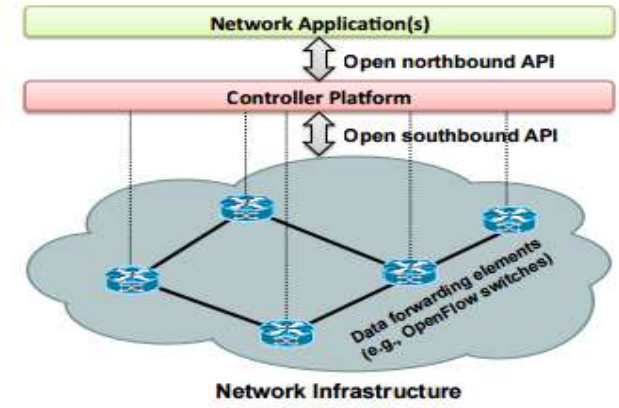

Fig. 1. Simplified view of an SDN architecture.

IV. CONCLUSION

Software Defined Network (SDN) came into existence to meet high data need of current world or cloud computing by segregating the control and data planes plus it develop the hardware virtualization concept and it becomes possible with this technology to program the network and have agile networks.

Professionals are exploring its programmability skills to devise way to make the network management simple as well as efficient and there is a lot of work being carried out on developing the protocol to make their programmability simple. However in spite of all the benefits and advantages that are coming with software defined network it has certain challenges as well that might consider as show stopper for its implementation in cloud computing and other organization so professionals should e aware of this challenges and should continue working resolving these issues to make this technology a one window solution.

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