

# SOFTWARE DEFINED NETWORKING: AN ADVANTAGE TO ENVIRONMENT

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## ABSTRACT

With the increasing development in technology, more and more number of network devices are attached to the network. What happens to the old network devices when we get a new one, how does the increasing amount of techno trash has the impact on environment Software Defined Networking (SDN) is the answer to all these questions. In traditional networks dedicated hardware were used for specific tasks which increases the overhead, complexity and more number of number of network devices to handle in for and ultimately increasing the e-waste but with the help of Software Defined Networking (SDN) the limitations of traditional networks are overcome. The basic idea behind it is the separation of control plane from data plane, now no more dependency on dedicated hardware is there. SDN has made the Networks more programmable easy to handle, less complex and because of no more dependency on dedicated hardware is there as a result same device can be used to for other tasks as well and with the less number of network devices, network can be managed easily. It ultimately proves to be a blessing to environment.

**Keywords:** Control plane, Data plane, Software Defined Networking.

## I. INTRODUCTION

Today computer networks are very complex as more and more devices are increasing day by day along with the content they access. The kind of equipment used in networks like Intrusion Detection system, switches, firewalls, Load balancers are typically very hard to manage by network administrator individually, the solution for this is Software Defined Networking. It has changed the way we used to manage the networks.

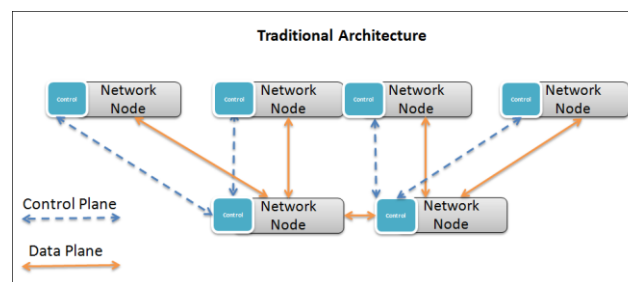
The two main basic principles of Software Defined Networking (SDN) are as follows:

- (1) It separates the control plane from data plane (control plane contains the intelligence, control logic while data plane contains the physical infrastructure or low level network elements that are used for packet forwarding and switching).
- (2) Control plane acts as a brain of the network which has a direct control over the Data plane, all the elements in the Data plane can be manipulated as per the needs and there is no need to configure each and every element of data plane individually.

Dramatically simplification of network management is done through SDN and ultimately it creates the innovation and evolution. Allowing the software developers to rely on network resources in the same easy manner as they do on storage and computing resources is the main basic idea behind it [1].

In Fig2.the architectural diagram for traditional networks is shown. Traditional Networks has slowed down innovation, because of their complexity, management and both the capital and operational expenses of running the network are high [2].In these types of networks, network administrators had to configure each and every device separately which is a very painful and tedious job. The configuration all these networking devices attached to the network is done according the different specified vendors. The control plane and the data plane are coupled inside the networking devices, which results in reducing flexibility. All the network devices consists of a control plane which provides the information for building the forwarding table and consultation from data plane is also done which is also constituted in the network device itself Decision on where to send the packets or frames is totally dependent on forwarding table. Both these planes (control plane and data plane) directly reside in the networking device.

These networks perform only dedicated functionalities so as result more number of networking devices are required to perform different functions and which increases the number networking devices used and ultimately e-waste, techno trash are also increasing which is a great threat to the environment.so we need such type of technology which overcomes these drawbacks of traditional networks and their the SDN has come into act.



**Fig.1 Traditional Networks**

## II . ARCHITECTURE

As shown in Fig.2. SDN is a three layered architecture; the main layer is control layer because controller resides in it, and controller acts as a brain to the network because it manages the flow of traffic from switches using flow tables. All three layers are dependent to each other and communicate with one another through some interfaces. The best advantage of SDN architecture is that it provides abstraction view of entire network for the applications it provides; this makes the network even more “Smarter”.

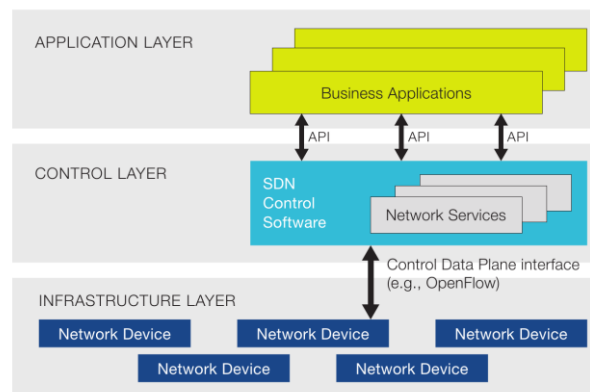
### 2.1 SDN Architecture contains the following three layers:

**Application Layer:** It is composed of the applications which are communicating with controller in control layer through some interfaces called as Northbound APIs.The commonly used API in providing Northbound API is REST (Representation State Transfer) API. Applications in SDN can be like Firewall, Load balancer etc.

**Control Layer:** It is the middle layer of the SDN architecture and constitutes the SDN controller which acts as a brain of the network and has a global view over the network also known as Control plane.

**Physical Layer:** It contains the infrastructure used in the network like switches, also known as Data plane. They provide packet forwarding and packet switching. Switches only perform the actions according to the controller.

The interface they use to communicate with controller situated in control layer is called as Southbound APIs. The most common protocol used in providing Southbound APIs is OpenFlow Protocol.



**Fig.2 SDN Architecture**

## 2.2 Advantages of SDN:

**Reduced Cost:** Huge investment is not required in case of SDN. SDN is supported by layer1 through layer3 networking model, so expensive networking devices are not required to buy. In case of production environment SDN is very helpful as the cost of buying expensive hardware is reduced [3].

### Easy Management:

Central Management at the control plane by the network administrator can be easily managed and help him to forward virtual packets to a physical device or software running on the network [3].

**Virtualization:** Virtualizing most of the physical network devices is done by SDN and as a result upgradation is very easy to perform because rather than doing it on several due to virtualization it can be done on a single piece of machine only, which ultimately reducing the fact of making use of many hardware devices and hence adding advantages for the environment as less number of machines are used [4]

**All networking needs are fulfilled in one product:** with the help of SDN all type of networking needs can be delivered to you using a single product because of the fact that SDN is using the centrally management tool rather than configuring physical routers (which are more in number) it becomes tedious job for a network administrator to manage them, so in the SDN console management of physical routers can be done by providing management of APIs [4].

**Lesser dependency on proprietary hardware & dedicated appliances:** with the help of virtual network services provided by the SDN there is no more dependency upon the proprietary & dedicated hardware appliances which performs only specific tasks.

**Speed:** Speed in providing the provisioning and while making the changes in the network traffic is very easy and rapidly done in case of SDN. Few command line (console) are used by the network admin to the controller and changes are done in the network traffic and as a result there is no need of hard wiring of network which ultimately makes a network more complex and generates more of e-waste.

## III . CONCLUSION

Due to the Dynamic management of traffic in networks provided by SDN technology, more bandwidth is available to the users. No more dependency is there on dedicated hardware which is a cost effective way too. An abstracted view of network is provided. SDN is considered to be the best solution for meeting the new demands

in networking. As SDN is an emerging technology so, research is still going on in order to make it more efficient way of networking. It is hoped that introduction about SDN its architecture here will prove to be helpful for the researchers working in this area.

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