

# Research on the Emergence and Development Trend of Software Defined Networks

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**Abstract:** *With the rise and development of computer networks, more and more network architecture systems have emerged, and software defined networks have also emerged. As a new type of network architecture system, it is used to achieve flexible control of network traffic and make the network a resource that can be flexibly allocated according to its own needs. For traditional networks, the architecture of traditional networks will encounter many problems, and the traditional network structure system is complex in hierarchy and has a large number of business volumes, making it difficult to cope with the development of future network systems and solve the problems of future network architecture. This article mainly introduces the emergence and development trends of software defined networks, as well as the help that software defined networks can bring to future network systems.*

**Keywords:** Computer; Network; Generate; Development Trends.

## 1. INTRODUCTION

The emergence of software defined networks has defined the expression of network virtualization, which can solve many problems that traditional networks cannot solve through private clouds[1-3]. The core features of software defined networks are openness, virtualization, and programmability, which divide the network into application plane, control plane, and forwarding plane. It also has a southbound interface, a northbound interface, and an east-west interface. The southbound interface provides a centralized control network architecture, the northbound interface provides resource abstraction, and the east-west interface provides an extensible interface[4-6]. It has outstanding advantages in the use and debugging of cloud management platforms, and can greatly improve business development requirements. Network operators can directly and effectively deploy relevant functions through controllable software, without waiting for new solutions to be added to dedicated devices, thereby simplifying the work required for network deployment. From this, it can be seen that the emergence of software defined networks has provided a lot of opportunities for the future network market, making the plasticity of networks stronger and making significant contributions to making network deployment more flexible in the future[7].

## 2. BACKGROUND OF THE EMERGENCE OF SOFTWARE DEFINED NETWORKS

### 2.1 Introduction to Software Defined Networking

Software Defined Network (SDN), also known as Software Defined Network, is essentially a software based network that enhances the programmability of the network and can be used for network architecture reconstruction[8-11]. SDN is faster, easier to operate, and has better architecture performance compared to the original network architecture. Any network system needs to go through four stages: requirement research, planning and design, deployment and implementation, and operation and maintenance, and SDN is no exception. In short, SDN is a new network system born with the rise of cloud computing, mobile Internet and the Internet of Things. It can better meet the needs of the current market, and make the network more flexible in meeting the needs of users through network programmability. It has made the network more flexible and further improved the development and management efficiency of the network, making it simpler[12]. Due to the increasing prevalence of sub-health issues in the current network, the contradiction between diverse and ever-changing network upper layer applications and businesses, as well as relatively stable network architecture design and system operation, is gradually expanding. Therefore, traditional networks can no longer meet the growing development of emerging projects. At this point, the role of software defined networks comes into play.

### 2.2 Software Defined Network Architecture System

Because our traditional network planning and design are carried out under the premise of relatively clear and stable application requirements, it includes network architecture, topology. The connectivity, security, and QoS policies of IP are pre-set and defined based on clear application requirements, which means it is relatively static[13]. Therefore, although we emphasize redundancy design in the network planning and design stage, so that it can be used in the operation and maintenance process according to changes in upper layer applications, and make some adjustments and responses, the space is relatively limited. The deployment and operation of traditional networks are mainly manual and supplemented by automation. In addition, the difficulty and complexity of adjusting the diversity of network device types and manufacturer sources in distributed network architecture are very high. Therefore, at this time, we must analyze and find solutions to the problem. In fact, the main problems can be summarized into two aspects. Firstly, due to the fact that traditional networks and their devices can only be configured and not Programmable, The second aspect is due to the distributed control and management architecture of the network. Simply put, traditional network architecture is not yet fully developed and can only perform the behaviors it can through pre-set programs. This makes traditional network architecture inconvenient and unable to handle problems flexibly. And because current network deployment and configuration management need to be implemented in everyone's hands to run specific devices, each device is tightly coupled with three planes: management plane, control plane, and data plane. If a new application is to be added in this distributed architecture, all network devices through which the data packets of this application flow may need to make corresponding changes in planning and configuration. Obviously, the workload of management is very large, which makes the efficiency of the network very low. When you want to run a program, the response speed will be very slow. However, for the current popular big data cloud computing traditional network, if you want to process these huge data, the time spent is huge, so a new network architecture system is needed at this time. Software defined networks were born to enable faster data processing, more timely response, and more flexible meeting of customer needs.

### **3. DEVELOPMENT TRENDS OF SOFTWARE DEFINED NETWORKING**

#### **3.1 The emergence of software defined networks**

Firstly, Software Defined Networking (SDN) was first proposed in 2011 by the National Natural Science Foundation of the United States as a network innovation experimental environment. It can support heterogeneous physical layer technologies and devices at the bottom layer and multi-source heterogeneous applications at the top layer. In 2011, a new enterprise network architecture was proposed that simplifies the network model through centralized control. In 2011-2012, The McKeown Group released the first open-source SDN controller and published two papers on SDN. In 2012, The McKeown Group also released the first Python based SDN controller POX and Openflow v1.0, which was rated as one of the "Top Ten Breakthrough Technologies of the Future" by MIT, indicating that software defined networks are highly recognized and valued. In the coming years, software defined networks will gradually move from their initial state to maturity, which greatly marks the gradual maturity of SDN architecture and the widespread attention and acceptance of SDN ideas in the industry, as well as the expansion of SDN application scale[14-16].

#### **3.2 Development of Software Defined Networking**

The emergence and development of software defined networks; Its application scope is constantly expanding. The SDN architecture is used for the deployment and operation of servers and devices in various data centers, and has also given rise to software defined SDN-DC data centers. Many Internet enterprise manufacturers, such as Amazon, Google, Facebook, Ali, Tencent, Baidu, etc., are deploying their own network data centers using the SDN architecture. It can be seen from this that software defines the wide range of applications of the network. This newly proposed network architecture has become an indispensable part of the future market. With the development of software defined networks, SDN wan has also appeared before us. This technology can not only deploy new WAN connections, but also upgrade and transform existing WAN by controlling controllers from various manufacturers through the southern interface of the main controller, and connecting APIs through the northern interface to achieve open interfaces for upper level business applications. In addition to data centers and wide area networks, software defined networks also penetrate into different scenarios of the network. For example, software defined security, software defined access, etc., using SDN access technology can achieve any service and policy on any port, and with the help of software definition, topology independent policy mobility can also be achieved[17-19].

#### **3.3 Integration of Software Defined Networks**

On the other hand, due to the development of intelligent manufacturing and the integration between IT and OT, software defined networks are gradually penetrating into industrial networks. These things indicate that software defined networks will be a necessary product in the future market, and the development trend of software defined networks cannot be underestimated[20]. Currently, in addition to the expanding application scope of software defined networks, their market size is also growing rapidly. The presence of SDN both domestically and internationally affects the proportion of the network market size, leading to its continuous expansion[21-23]. In addition, software defined networks also have strong technological integration, which can integrate and develop with many network technologies, giving rise to more products that conform to the development of the times, such as integration with today's 5G networks, integration with artificial intelligence, integration with IPV6, etc. With the integration of these emerging products, software defined networks can also achieve a new intelligent network architecture, such as "intent based networks"[24-25]. Of course, whenever an industry emerges, the demand for talent behind it is also quite high. In summary, it is not difficult to see that the development trend of software defined networks is very promising. It can cover any part of the network architecture system and integrate the advantages of other network products through seamless integration, developing a more convenient and fast new industry. Its contribution to the future market is significant.

#### 4. CONCLUSION

With the continuous development of China's economic strength, I believe that software defined networks, as a network architecture system, will have a broad market demand in the future. Currently, software defined networks are gradually moving towards the next mature stage. We should have an optimistic spirit towards software defined networking, only in this way can software defined networking go further and become more outstanding in the future market. As is well known, in today's era, due to the emergence of network systems, the future network architecture system will inevitably require a flexible and versatile architecture pattern, a network architecture system that can adapt to multiple environments and is easy to operate. The emergence of software defined networks is precisely to solve such multiple situations. At the same time, we should also pay attention to the various characteristics of software defined networks, in order to diversify and meet the development of various network architectures.

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