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## SDN: Software-Defined Networks

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Today's communication networks are designed around the original mechanisms of Ethernet and TCP/IP. Because of the success of these early technologies, networks grew bigger and more complex, which led to a need for more complex control options, such as VLANs and ACLs. A variety of heterogeneous network appliances such as firewalls, load balancers, IDS, optimizers, and so on, each implement their own proprietary control stack. Reciprocal communication is handled by other complex protocols such as Spanning Tree, Shortest Path Bridging, Border Gateway, or similar. Each additional component thus increases the complexity and complicates integrated network management. The consequences are often low network utilization, poor manageability, lack of control options in cross-network configurations, and vendor lock-in.

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One way out of this dilemma is Software Defined Networks (SDNs) and OpenFlow. OpenFlow is an Open Networking Foundation (ONF) standard protocol that abstracts the complex details of a fast and efficient switching architecture. Today, OpenFlow offers an open control interface that is now implemented in hardware by all major network component manufacturers. Several vendors even offer software switches that support virtualized datacenters. OpenFlow also supports the concept of separating the data and control paths, which lets a central control point oversee a variety of OpenFlow-enabled network components. The SDN controller could even be a distributed application to provide additional security, fault-tolerance, or load balancing.

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This presentation focuses on a general introduction to Software Defined Networking and OpenFlow. We shed light on various aspects of today's network management and its challenges and elaborate on possible solutions offered by SDN. Moreover, the hands-on tutorial addresses the OpenDaylight SDN controller. To this end, we install, configure, and run OpenDaylight. We emulate a small network using the MiniNet Network Emulator and have OpenDaylight manage the data flows in that network. We will experience the beauty of such a centralized solution and discuss further areas of application, such as cloud computing and OpenStack, for instance.

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