

Learning Resource

What Is Software-Defined Networking?

Software-defined networking (SDN) is a way to approach networking of computers through software abstractions in place of specialized hardware. By abstracting some of the low-level functionality of the network into a software application, it allows network administrators to more easily manage dynamic networks.

In a most basic sense, software-defined networking separates the part of the networking infrastructure that decides where information is being sent (called the "control plane") from the part where the data actually moves (the "data plane"), and allows the decision-making part to occur in the software application.

Open source, open standards, and open protocols are all important to software-defined networking. Since networking is, by definition, an activity which connects related systems, it is important that standards exist to manage this communication.

In traditional networking infrastructure, much of the control of network traffic is done by proprietary hardware solutions running proprietary software, or a mix of proprietary and open source software on top of them. Software-defined networking allows for an openness not previously available.

Software-defined networking also opens other possibilities for virtualizing parts of the networking infrastructure that had not been possible. Below are some of the terms and organizations that address some of these networking needs.

Network functions virtualization (NFV) is a related concept, which is often but not always used in concert with SDN, which allows network services to be virtualized. These services include, but are not limited to, functions like firewalls, caching, routing, security services, load balancers, and other similar processes that have often in the past been carried out by

dedicated hardware devices. Instead of running on dedicated devices, which are often proprietary, the functions can be carried out by virtual machines running inside of a data center.

NFV is important to a number of industries, but telecommunications companies have been one of the main drivers of the technology. Of the many benefits of NFV, one of particular value is the ability to scale capacity through virtualized infrastructure instead of having to purchase and add new machines every time capacity is reached. This allows for cheaper and more flexible operations, and also in some circumstances means that the processing of network data can happen closer to the location where it originates.

OpenDaylight is a collaborative project hosted by the Linux Foundation that provides "an open platform for network programmability to enable SDN and create a solid foundation for NFV for networks at any size and scale." In other words, it is an open-source controller for SDNs. Its goal is to provide a common framework that will provide consistency across the industry while enjoying the benefits of collaborative design and code from across a wide group of project partners.

Neutron is the networking component of OpenStack. At its most basic level, it manages networks and IP addresses within OpenStack, which had originally been managed as a part of the Nova compute component.

Neutron by itself is not a full networking stack. It connects OpenStack to an underlying networking infrastructure that can be provided by any number of physical and virtual devices. The plug-in infrastructure makes Neutron compatible with the infrastructure already in place in a number of data centers, and helps bridge it to future solutions that may yet to be created.

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