

**STEVE
GUENDERT,
PH.D.**



Software Defined Networking (SDN) is a relatively new approach to computer networking that evolved from some preliminary research and work done at the University of California-Berkeley and Stanford University in 2005. SDN allows network administrators to manage network services through abstraction

of lower-level functionality. This is done by decoupling the system that makes decisions about where traffic is sent (the control plane) from the underlying systems that forward traffic to the selected destination (the data plane). Enterprises are being forced to meet the needs of increasingly global and virtualized customers and organizations. Unfortunately, their existing monolithic, inflexible networks are a major limiting factor. Faced with flat or reduced budgets, enterprise IT departments are trying to squeeze the most from their networks using device-level management tools and manual processes. Traditional, hierarchical, closed network infrastructures restrict innovation and limit the services the network operations team can offer. Existing network architectures weren't designed to meet today's requirements. Today's network architectures are constrained by three things: inability to scale, complexity and vendor dependence.

SDN is intended to solve these problems; it's an emerging concept that proposes to disaggregate traditionally vertically integrated networking stacks to improve network feature velocity and customize network operation for specialized environments. At the same time, this disaggregation will improve network flexibility and manageability. SDN enables "mass customization" of network operations to better support differentiated cloud services. SDN is comprised of a group of technologies that open the data, control and management planes of the network to participate more easily in broader orchestration frameworks through Application Programming Interfaces (APIs).

SDN is an overarching framework that encompasses protocols and technologies and affects all planes in the network. In the SDN architecture, the control and data planes are decoupled. Network intelligence and state are logically centralized, and the underlying network infrastructure is abstracted from the applications. As a result, enterprises gain unprecedented programmability, automation and network control. This in turn gives enterprises the ability to build highly scalable, extremely flexible networks that readily adapt to changing business needs.

SDN is driven by the Open Networking Foundation

(ONF), a non-profit industry consortium that has enlisted more than 60 major companies as its members. The ONF is leading the advancement of SDN and is standardizing elements of the SDN architectures such as the OpenFlow protocol, which is the first standard

interface designed specifically for SDN. OpenFlow provides high-performance, granular traffic control across multiple vendors' network devices.

Simply stated, SDN is the continuation of the network transformation started by Ethernet fabrics. Just as Ethernet fabrics simplify network management and operations on the physical level, SDN does so on the logical level. Ethernet fabrics provide the network fabric layer of a complete SDN-based solution, emphasizing reliability and simplicity in the foundation of the solution. By combining Ethernet fabrics with SDN, network architects can optimize their network for virtualization on every level and enable the kind of collaboration that's proving to be key in future network designs and implementations. The combination of Ethernet fabrics and SDN allows the static networks of today to evolve into an extensible service delivery platform for tomorrow. Such a platform is capable of rapidly responding to changing business and end-user needs. SDN is on its way to becoming the new norm for networks.

How Does the Mainframe Fit In?

Ethernet fabrics and SDN really are the foundation for highly virtualized cloud computing environments. An argument could be made that the modern IBM mainframe environment is a cloud unto itself. A zEnterprise platform, running a variety of operating systems, coupled with a zBladeCenter Extension (zBX) could very well be the center of a cloud computing architecture for many enterprises. Also, consider this: Isn't a lot of the way the modern IBM mainframe does networking already a form of SDN? Perhaps SDN really is just yet another thing the modern mainframe has led the way with. **EE**

Dr. Steve Guendert is a principal engineer and global solutions architect for Brocade Communications, where he leads the mainframe-related business efforts. A senior member of both the Institute of Electrical and Electronics Engineers (IEEE) and the Association for Computing Machinery (ACM), he serves on the board of directors for the Computer Measurement Group (CMG). He is also a former member of the SHARE Board of Directors. Email: stephen.guendert@brocade.com Twitter: @BRCD_DrSteve

Software
Defined
Networking:
A New
Paradigm?