

# Keynote: SDN for the Cloud

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## ABSTRACT

Cloud computing is a new paradigm, which touches everything from enterprise data centers, to wide area networks, to massive scale data centers, with millions of servers. Coordinating such large systems requires a new way to control the network – setting a target state for each component and driving each to the goal state, so that the network meets global objectives, in a sea of growth and change: customers creating and adapting virtual networks at amazing pace, while new features are rolled out, new data centers are built out and older ones decommissioned. Software Defined Networking (SDN) is a key enabling technology, built on principles of delivering direct control and network-wide views. At Microsoft Azure, we pioneered these principles, and built them into the fabric of the Cloud.

I will discuss the SDN journey and my personal journey from WAN to Cloud, covering some of the hard problems that gave birth to the SDN design principles, which thanks to the investments of amazing teams, led to high scale, highly reliable, high performance, and flexible networks. As cloud computing evolves, the journey continues, with amazing innovation in hardware and software. I discuss some new directions and challenges we are tackling at Microsoft Azure, that enables and accelerates further innovation, and close with an Azure SmartNIC demo. You will hear about more of these ideas and see the Azure Cloud Switch demo at the conference.

## BIO

Distinguished Engineer and Director of Development for Microsoft Azure Networking, leading software and hardware development and engineering for Microsoft's networks, for all Microsoft first and third parties, encompassing physical data center, regional and wide area networking, host networking datapath, virtual networking, virtual appliances, network services, edge networks and services.

Azure is built on SDN principles, which the team pioneered as the inevitable and right way to scale the cloud. Major offices for Azure networking are in Redmond, Beijing, Hyderabad, and Dublin, all working to transform networking to become cloud optimized, low cost, high performance, super reliable and automated.

Within Azure, founded and led the network virtualization, datapath and physical data center network teams in Azure, as well as other teams in networking and monitoring. Worked in the Networking Research Group at Microsoft Research on the data center networking technologies now widely deployed in Microsoft services and products, such as Virtual Layer-2 (VL2), Virtual Networks (VNETs), Load Balancing (Ananta), Data Center TCP (DCTCP). Joined Microsoft from Bell Labs and AT&T Labs Research, where he was an AT&T Fellow and Executive Director, and where he helped build the systems and tools for engineering and managing AT&T's networks.

IEEE Kobayashi Award winner, ACM Fellow, ACM SIGCOMM Award winner, ACM Test of Time Paper Award winner. Serves on the board and the technical advisory council of the Open Networking Foundation.