

Software-defined networking with Windows Server 2012 R2 and System Center 2012 R2

Modern workloads require flexible and agile information technology environments. Increasingly, organizations need virtualization, automation and the ability to incorporate cloud-related technologies. This means that traditional, rigid, physical networking infrastructures need to evolve to keep pace.

With software-defined networking (SDN) from Microsoft, you move control of the network from hardware to software, which reduces operational rigidity and enables new levels of efficiency, flexibility and scale. Windows Server 2012 R2 and System Center 2012 R2 help make your network a pooled, automated resource that supports isolated networks and virtual machines and allows you to seamlessly integrate across datacenter boundaries and into the cloud.

Transform your network

By taking advantage of the SDN functionality built into Windows Server 2012 R2, you can create a network infrastructure optimized for modern applications.

- **Hyper-V Network Virtualization** provides a virtual network abstraction of your physical network. Administrators can use the abstraction to achieve isolation and virtual machine mobility in completely new ways. You can, for example, host multi-tenant environments and isolate traffic in a dedicated virtual network independently of the physical infrastructure and without using Virtual Local Area Networks (VLANs). You also can move virtual machines between physical servers, sites, and into the cloud while preserving virtual network assignments and policies. Capabilities include:
 - Deployment of multiple virtual networks, including networks with overlapping IP addresses, on the same physical network.
 - End-to-end network virtualization using Network Generic Routing Encapsulation (NVGRE), which enables virtual machine isolation.
 - Live migration of virtual machines across different physical networks while automatically maintaining the virtual machine's IP address and networking policies.
 - A foundation for disaster recovery to other sites and in the cloud, by enabling mobility of virtual machines, network configurations, and policies.
 - Enhanced diagnostics for troubleshooting network configurations and policies across multiple network boundaries.
- **The Hyper-V Extensible Switch** is a foundational component of network device virtualization in Hyper-V. It powers flexible networking in some of the largest datacenters in the world, including the Microsoft Azure global networking infrastructure. The extensible software switch enables partners to provide switch functionality to more effectively manage virtualized network architecture. Features include:
 - Rich support for policies that provide performance, compliance and security in the overall network environment, including Access Control Lists, Quality of Service, Service Level Agreements, Dynamic Host Configuration Protocol (DHCP) Guard, and Router Guard.
 - Filtering of inbound and outbound packets based on network address, application port, and protocol type.
 - Unified management of switch extensions from multiple vendors.
 - Support for multiple vendor extensions on the same virtual switch, which allows broad capabilities on a single server.
 - Hybrid forwarding to direct packets to different forwarding agents, based upon a variety of packet and operational criteria.
 - Support for the Cisco Nexus 1000V for Hyper-V, which enables the Hyper-V virtual switch to act similar to a Cisco virtual switch.

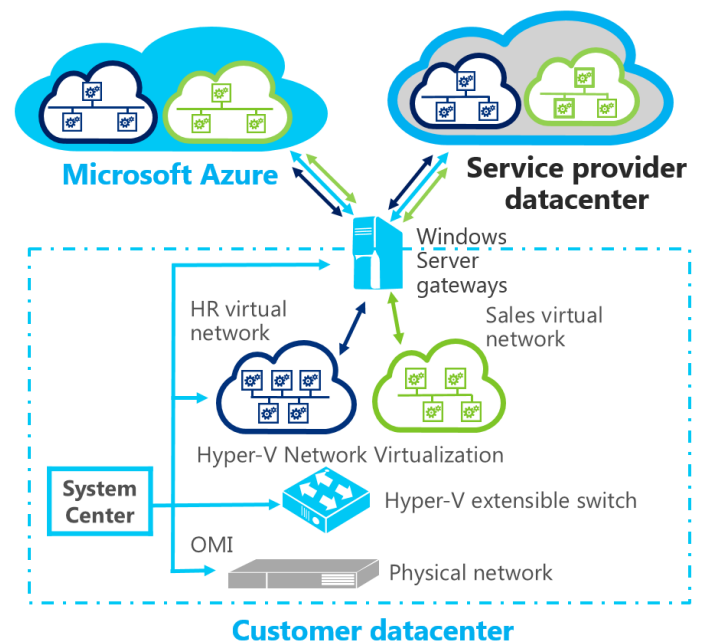
- Integration with NEC OpenFlow extension, which enables the virtual switch to act similar to an OpenFlow controller.
- **Windows Server 2012 R2 Multi-Tenant VPN Gateway** seamlessly connects physical and virtual networks, enabling you to extend multiple virtual networks beyond your datacenter to another private datacenter or hosted environment such as Microsoft Azure. The Gateway can be configured for high-availability and can support more than 100 tenants. In addition, customers and hosting providers can set up a single gateway for virtual private network (VPN), Network Address Translation (NAT), and NVGRE routing to multiple private clouds through a single entry point, while maintaining isolation.

- **Azure Express Route** enables dedicated, private, high-throughput network connectivity between Azure datacenters and on-premises IT environments. It provides connections with faster speeds, lower latencies, and higher security than typical Internet connections. Express Route can also be a robust option for transferring large data sets for high performance computing applications or for moving large virtual machines between an Azure dev/test environment and on-premises production environments.

Ensure comprehensive management and connectivity

Microsoft has created the most comprehensive SDN-related ecosystem in the industry, including support for industry standards and partner extensions. Management and connectivity options include:

- **System Center 2012 R2 Virtual Machine Manager** centrally defines, creates and controls policies that govern both physical and virtual networks, including partner extensions and traffic flow. You can configure virtual networks, virtual switches, and switch extensions, and push configurations to physical and virtual hosts.
- **The Open Management Infrastructure (OMI)** helps simplify multi-vendor device management for inclusion in the overall Microsoft SDN solution architecture. OMI is a portable, small footprint, high-performance Common Information Model (CIM) Object Manager. Using OMI and System Center 2012 R2 Virtual Machine Manager, you can rapidly configure devices, such as Cisco Nexus 3000 and Arista Networks top-of-rack (TOR) switches, in an automated way.



With Windows Server 2012 R2 and System Center 2012 R2 Virtual Machine Manager, your network becomes a pooled resource that can be defined by software, managed centrally through automation, and extended beyond your datacenter.

Find out more: www.microsoft.com/SDN