Windows Server 2019
Networking

Christian Kreutzer

TECHATIVE GMBH
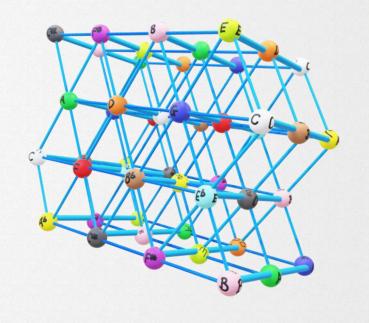
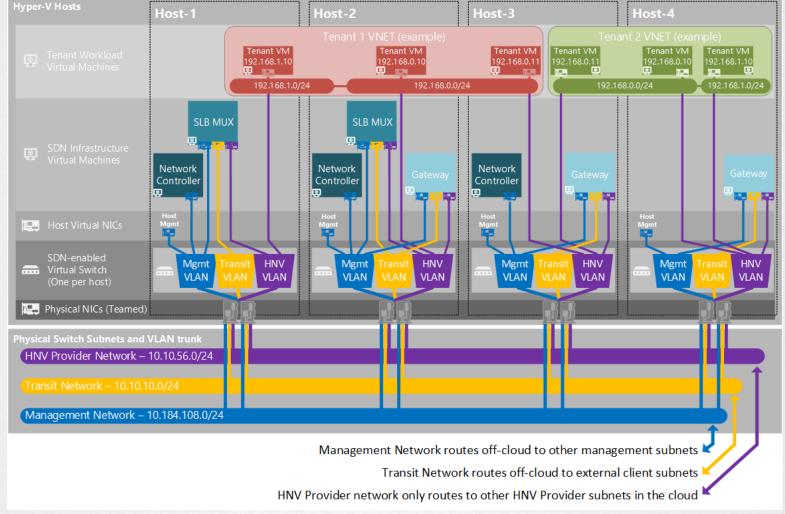@grisukreutzer

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Windows Server 2019

Whats new in
Software Defined Networking

SDN Stack

https://docs.microsoft.com/de-de/windows-server/networking/sdn/plan/plan-a-software-defined-network-infrastructure

What's new in 2019?

New in Networking!

Windows Server 2019

- Hyperconverged SDN and Container Networking
- Modern transports and web protocols
- Mission-critical network perf and time accuracy

#1 Container Networking with Kubernetes

#2 Propelling broadcast video with DPDK on Windows

#3 Azure Network Adapter for hybrid deployments

#4 Security advancements with SDN

#5 Network Performance Improvements for Virtual Workloads

#6 High Performance SDN Gateways

#7 SDN Goes Mainstream

#8 A Faster, Safer Internet

#9 LEDBAT – Latency Optimized Background Transport

#10 Accurate Network Time

https://techcommunity.microsoft.com/t5/Networking-Blog/Top-10-Networking-Features-in-Windows-Server-2019-Wrapping-up/ba-p/339793

#1 – Kubernetes

Kubernetes on Windows Server

Windows Server 2016
- Introducing Windows Server container
- Windows Server container with Hyper-V isolation
- Enterprise Docker EE support on Windows Server

Windows Server, version 1803
- Optimizations to server core container base image
- Networking enhancements for greater density and quicker endpoint creation
- Network policy enforcement with Calico (beta)
- NAT throughput improvements

Kubernetes 1.9 released (beta support for Windows!)

Open-sourced storage plugins for Windows (iSCSI & SMB!)

Kubernetes 1.10 released!

Kubernetes 1.13 release (proposed WS2019 GA!)

DNS search suffixes set per container!

Simplified network topology (1 vNIC per pod!)

Windows pod metrics and stats!

SIG-Windows community page founded!

Oct 2016

Mar 2017

Oct 2017

Apr 2018

Oct 2018

Kubelet & kube-proxy on Windows!

Open-sourced Windows CNI Plugin!

Kubernetes 1.12 release!

ConfigMaps, persistent volumes, and Kubernetes secrets!

Kube-proxy kernel-mode load-balancing!

Kubernetes 1.11 released!

Fluentd logging for Windows containers announced!

Kube-proxy & kubelet can be run as a Windows service!

Windows Server, version 1709
- Introducing Kubernetes on Windows
- Multiple containers per pod
- Platform level support for Linux containers on Windows (LCOW)
- Container networking enhancements for overlays and SDN
- Windows container networking plugin (wincni) developed

Windows Server 2019
- Optimizations to Server Core container base image
- Improved compatibility for apps running in containers
- Pods with Hyper-V Isolation
- Container performance and density improvements
- Key quality and conformance testing improvements

Community Milestone

LTSC Release

SAC Release

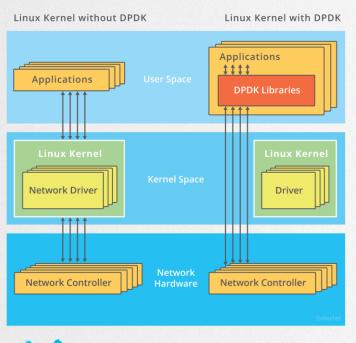Kubernetes OSS Work

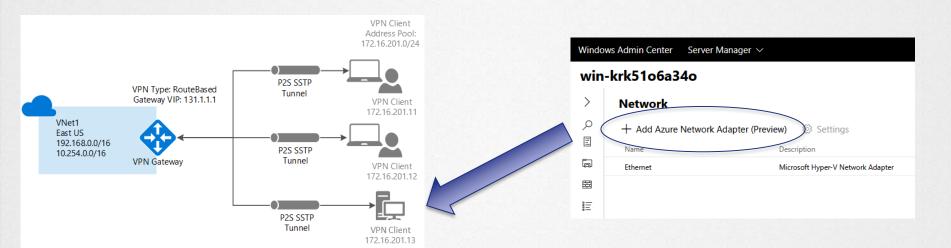https://blogs.technet.microsoft.com/networking/2018/09/19/ws2019-kubernetes/

#2 – DPDK on Windows

#3 – Azure Network Adapter

#4 – Security

- Encrypted Subnets
- Firewall Logging
- Fabric ACLs
- Virtual Network Peering
- IPv6 support

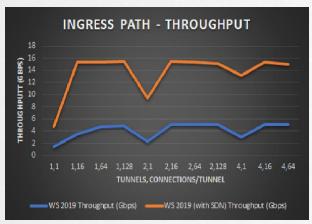# #5 – Performance

- Receive Segment Coalescing in the vSwitch

	Average CPU Utilization	Average Throughput
Without RSC in the vSwitch	28%	23.9 Gbps
With RSC in the vSwitch	23%	37.9 Gbps
—Totals	**17.86% Decrease** in CPU	**58.58% Increase** in Throughput
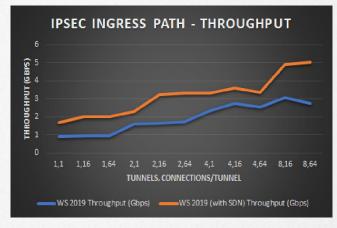
- Dynamic Virtual Machine Multi-Queue (d.VMMQ)

#6 – SDN Gateways

- IPsec tunnels
- GRE tunnels (Generic Routing Encapsulation)

#7 – SDN Express
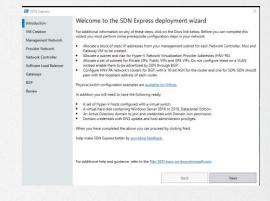
- SDN Express Deployment Wizard

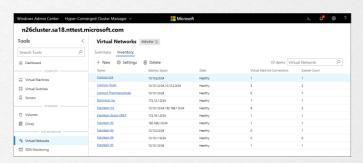- SDN Express PowerShell module

```
import-module .\SDNExpressModule.psm1

$restname = 'SDN.CONTOSO.COM'
$rootcerts = get-childitem "cert:\localmachine\root"
$hostcert = $rootcerts | ? {$_.Subject -eq "CN=$restname"}

Add-SDNExpressHost -ComputerName 'Host5' -RestName $restname -HostPASubnetPrefix '10.0.0.0/24' -NCHos
```

- Windows Admin Center
  Hyper-Converged Cluster Manager

https://blogs.technet.microsoft.com/networking/2018/08/08/sdn-goes-mainstream/
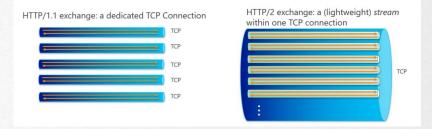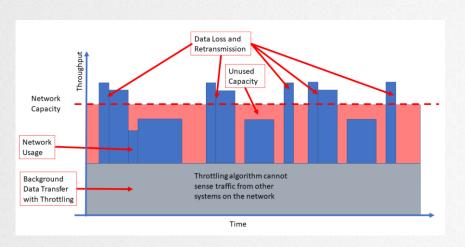
#8 – HTTP/2

- support for HTTP/2 (RFC 7540) since Server 2016 IIS

- Enhancements
    - Multiplexing
    - Header Compression
    - Cubic is standard congestion control provider
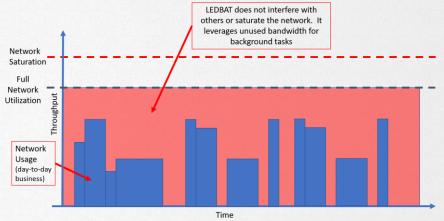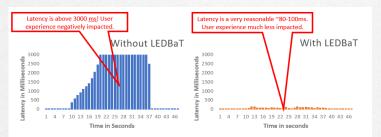   - Security

- Demo: https://http2.akamai.com/demo

#9 – LEDBAT

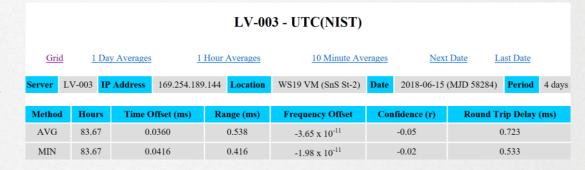## Low Extra Delay Background Transport

#10 – Accurate Network Time

- Compliant Leap Second Support
- Accuracy Improvements (Precision Time Protocol, Software Time-stamping, Clock Source Stability)

- Precision Time Protocol is not for everyone; due to the network configuration requirements, NTP will continue as the default protocol!

- Traceability
  - system logging
  - performance counters

LV-003 - UTC(NIST)

Grid	1 Day Averages	1 Hour Averages	10 Minute Averages	Next Date	Last Date

Server	LV-003	IP Address	169.254.189.144	Location	WS19 VM (SnS St-2)	Date	2018-06-15 (MJD 58284)	Period	4 days

Method	Hours	Time Offset (ms)	Range (ms)	Frequency Offset	Confidence (r)	Round Trip Delay (ms)
AVG	83.67	0.0360	0.538	-3.65×10^{-11}	-0.05	0.723
MIN	83.67	0.0416	0.416	-1.98×10^{-11}	-0.02	0.533

SRV2019 – Feature on Demand

- FoD improves application compatibility of Windows Server Core by adding binaries and packages from Windows Server with Desktop Experience, without adding the Windows Server Desktop UI

Available as FOD (digest)

- Event Viewer (Eventvwr.msc)
- Performance Monitor (PerfMon.exe)
- Resource Monitor (Resmon.exe)
- Device Manager (Devmgmt.msc)
- Microsoft Management Console (mmc.exe)
- File Explorer (Explorer.exe)
- Internet Explorer
- Windows PowerShell (Powershell_ISE.exe)
- Failover Cluster Manager (CluAdmin.msc)

https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/features-on-demand-v2--capabilities

SRV2019 – FoD DEMO

```
D:\>DISM /Online /Add-Capability /CapabilityName:"ServerCore.AppCompatibility~~~~0.0.1.0" /source:d: /LimitAccess

Deployment Image Servicing and Management tool
Version: 10.0.17763.1

Image Version: 10.0.17763.107

[==========================100.0%==========================]
The operation completed successfully.
Restart Windows to complete this operation.
Do you want to restart the computer now? (Y/N)
```

Server2019-Core (192.168.99.102) on SBOOK-CKR - Virtual Machine Connection

File   Action   Media   Clipboard   View   Help

```
Administrator
Working on updates 19% complete Don't turn off your computer
```

```
D:\>DISM /online /add-package:"Microsoft-Windows-Server-AppCompat-FoD-Package~31bf3856ad364e35~amd64~en-US~.cab"

Deployment Image Servicing and Management tool
Version: 10.0.17763.1

Image Version: 10.0.17763.107

Processing 1 of 1 - Adding package Microsoft-Windows-Server-AppCompat-FoD-Package~31bf3856ad364e35~amd64~en-US~10.0.17763.1
[==========================100.0%==========================]
The operation completed successfully.
```

```
D:\>DISM /online /add-package:"Microsoft-Windows-InternetExplorer-Optional-Package~31bf3856ad364e35~amd64~en-US~.cab"

Deployment Image Servicing and Management tool
Version: 10.0.17763.1

Image Version: 10.0.17763.107

Processing 1 of 1 - Adding package Microsoft-Windows-InternetExplorer-Optional-Package~31bf3856ad364e35~amd64~en-US~11.0.17763.1
[==========================100.0%==========================]
The operation completed successfully.
```

references

- **Modernize your datacenter with Software-Defined Networking (SDN) in Windows Server - BRK3215**
https://www.youtube.com/watch?v=oUTj7xI_Bpg

- **Top 10 Networking Features in Windows Server 2019: Wrapping up!**
https://techcommunity.microsoft.com/t5/Networking-Blog/Top-10-Networking-Features-in-Windows-Server-2019-Wrapping-up/ba-p/339793

- **SDN in Windows Server**
https://docs.microsoft.com/en-us/windows-server/networking/sdn/software-defined-networking

- **Features On Demand**
https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/features-on-demand-v2--capabilities

- **Tools and more on GitHub**
https://github.com/Microsoft/SDN

Q&A