



C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccSetlgr.exe  
C:\Program Files\Kerio\Personal Firewall 4\Kp  
C:\Program Files\Norton AntiVirus\navapsvc.exe  
C:\Program Files\Norton AntiVirus\IWP\NPFMntd  
C:\Program Files\Norton AntiVirus\AdvTools\N  
C:\Program Files\Fichiers communs\Symantec S  
C:\Program Files\Kerio\Personal Firewall 4\kp  
C:\Program Files\Fichiers communs\Symantec S  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec S  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\Program Files\Fichiers communs\Symantec S  
C:\WINDOWS\Explorer.EXE  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point  
C:\Program Files\Lavasoft\Ad-Aware SE Profess  
C:\Program Files\Fichiers communs\Symantec S  
C:\Program Files\QuickTime\qttask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe

SDN



OWASP  
Open Web Application  
Security Project





LogFile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpff4ss.exe  
C:\Program Files\Norton AntiVirus\navapsvc.exe  
C:\Program Files\Norton AntiVirus\IWP\NPFMntor.exe  
C:\Program Files\Norton AntiVirus\AdvTools\NPPORTFIREWALL.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpff4gui.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccEvtMgr.exe  
C:\WINDOWS\Explorer.EXE  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe  
C:\Program Files\QuickTime\qtask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpff4gui.exe  
C:\WINDOWS\System32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimian.exe

**Is it really that bad out there ???**

White Hat Help



LogFile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows  
MSIE: Internet Exp...  
...er 7.0.5723.1112

A photograph of a computer keyboard where the keys have been replaced by small white blocks. The blocks are labeled with country names: China, Russia, Israel, and USA. The labels are rotated to fit the shape of the keys. The original keyboard keys are visible in the background, showing paths like C:\WINDOWS\System32 and C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe.



## OPM Breach Just Put America's Spies 'At High Risk'

JUNE 12, 2015 BY PATRICK TUCKER

Hackers may now have detailed biographical information and a virtual phonebook of virtually every United States intelligence asset. Intelligence ▾



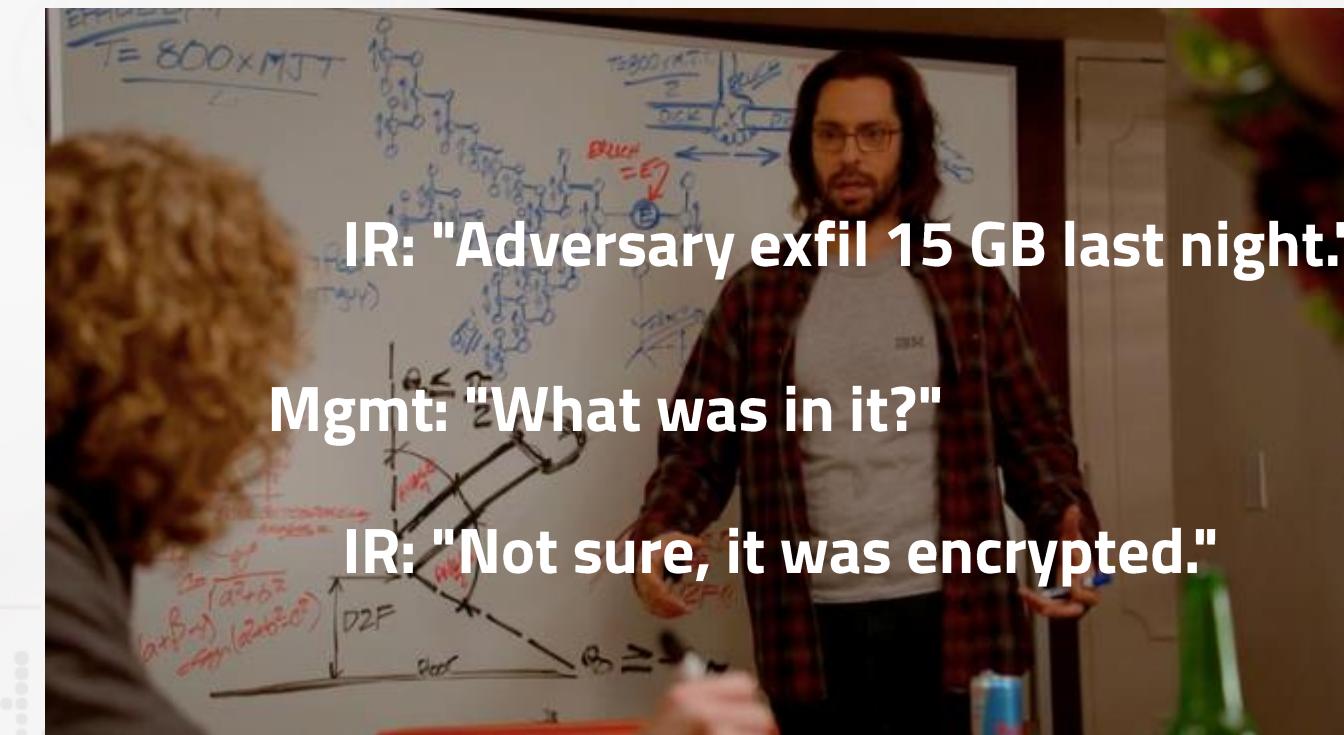
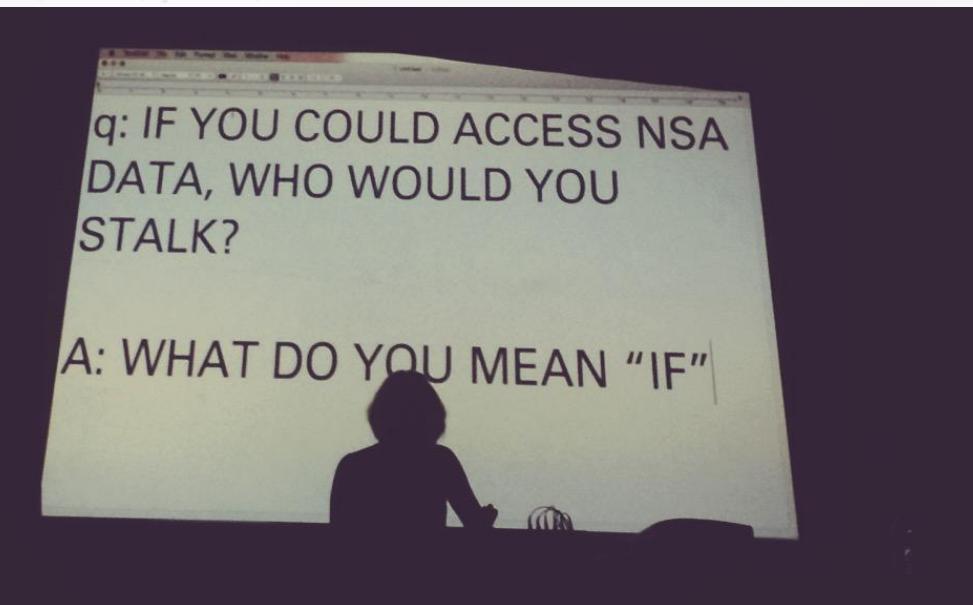
## Emails blamed for Bundestag cyberattack

The cyberattack on Germany's parliament has been traced to a link contained in at least two emails, according to a newspaper report. Parliamentarians left unaware of the breach for three weeks have slammed the delay.



# Security Mindset Have Changed But rarely implemented

- Zero-Trust
- Assume breached





# YAHOO!

## AppSec is Eating Security

PRESENTED BY **Alex Stamos** | AppSec Cali | January 27, 2015

### Alex Stamos - Yahoo's CISO and VP of InfoSEC

```
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe
C:\Program Files\Kerio\Personal Firewall 4\kpf4ss.exe
C:\Program Files\Norton AntiVirus\IWP\NPFIIntor.exe
C:\Program Files\Norton AntiVirus\AdvTools\NPROTECT.EXE
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrvc.exe
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe
C:\Program Files\Fichiers communs\Symantec Shared\SPBBC\SPBBCSvc.exe
C:\WINDOWS\System32\svchost.exe
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe
```

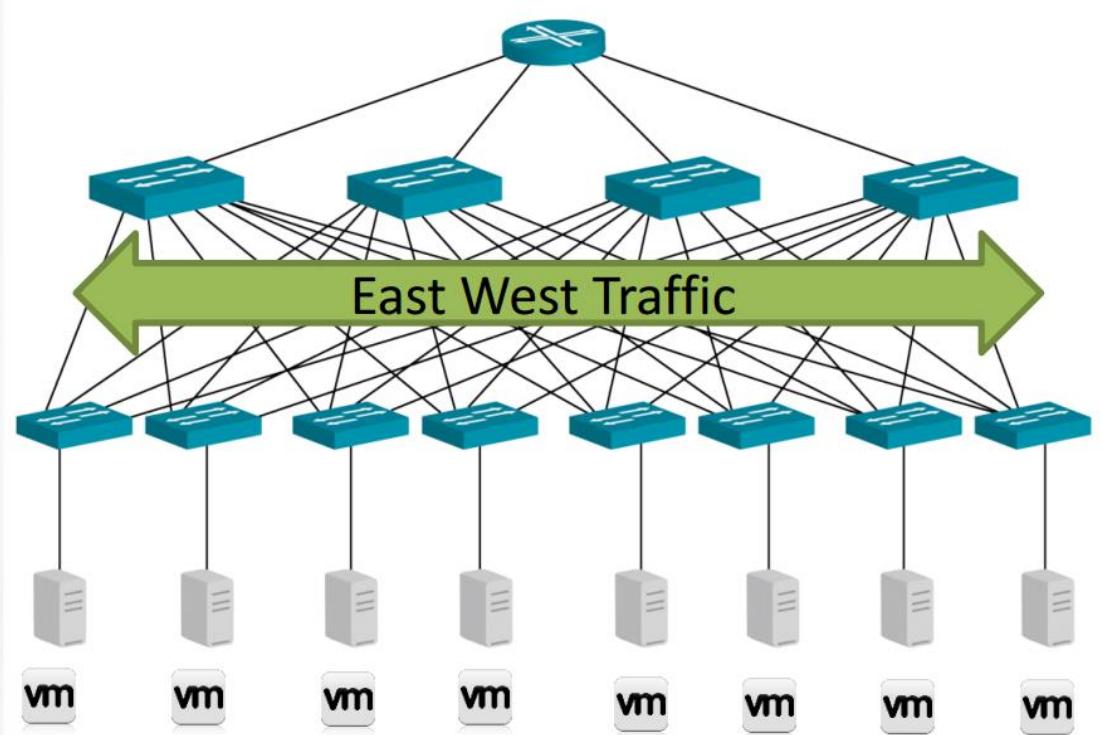
Security hardware is becoming un-buyable



Arista 7508E  
1152 x 10GbE  
30Tbps backplane  
5kW



Palo Alto 7050  
120Gbps throughput  
2.4kW



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:

C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\W...

C:\...

Compare Search terms ▾**Software-defined networking**

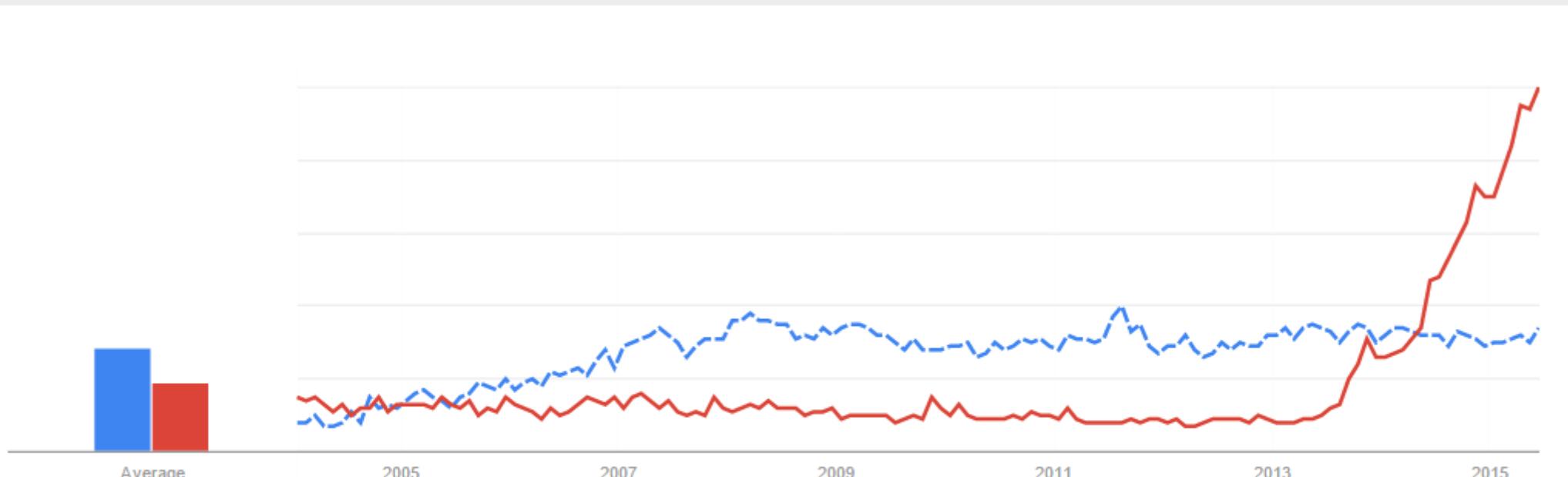
Topic

**docker**

Search term

[+ Add term](#)

Beta: Measuring search interest in *topics* is a beta feature which quickly provides accurate measurements of overall search interest. To measure search interest for a specific *query*, select the "search term" option. [?](#)

Interest over time [?](#) News headlines Forecast [?](#)

&lt;/&gt;

# Misconceptions

# OpenFlow Management

## Automation Buzzword NFV

## Protocol Controller API





```

C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe
C:\Program Files\Kerio\Personal Firewall 4\knf4ee.exe
C:\Program Files\Norton AntiVirus\navapsvc.
C:\Program Files\Norton AntiVirus\IWP\NPFWr
C:\Program Files\Norton AntiVirus\AdvTools
C:\Program Files\Fichiers communs\Symantec
C:\Program Files\Kerio\Personal Firewall 4
C:\Program Files\Fichiers communs\Symantec
C:\WINDOWS\System32\svchost.exe
C:\Program Files\Fichiers communs\Symantec
C:\WINDOWS\system32\Ati2evxx.exe
C:\Program Files\Fichiers communs\Symantec
C:\WINDOWS\Explorer.EXE
C:\WINDOWS\SOUNDMAN.EXE
C:\Program Files\Microsoft IntelliPoint\poi
C:\Program Files\Lavasoft\Ad-Aware SE Prof
C:\Program Files\Fichiers communs\Symantec
C:\Program Files\QuickTime\qtask.exe
C:\Program Files\Logitech\Video\LogiTray.e
C:\Program Files\MSN Messenger\msnmgr.exe
C:\Program Files\SAGEM\SAGEM F@st 800-840\c
C:\Program Files\WinZip\WZQKPICK.EXE
C:\Program Files\Kerio\Personal Firewall 4
C:\WINDOWS\system32\LVComS.exe
C:\Program Files\Logitech\Video\LowLight.e
C:\Program Files\Internet Explorer\IEXPLORE
C:\Program Files\Outlook Express\msimn.exe

```



## 1996

```

Router> enable
Router# configure terminal
Router(config)# enable secret cisco
Router(config)# ip route 0.0.0.0 0.0.0.0 20.2.2.3
Router(config)# interface ethernet0
Router(config-if)# ip address 10.1.1.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface serial0
Router(config-if)# ip address 20.2.2.2 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 20.0.0.0
Router(config-router)# exit
Router(config)# exit
Router# copy running-config startup-config
Router# disable
Router>

```

Terminal Protocol: **Telnet**

## 2013

```

Router> enable
Router# configure terminal
Router(config)# enable secret cisco
Router(config)# ip route 0.0.0.0 0.0.0.0 20.2.2.3
Router(config)# interface ethernet0
Router(config-if)# ip address 10.1.1.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface serial0
Router(config-if)# ip address 20.2.2.2 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 20.0.0.0
Router(config-router)# exit
Router(config)# exit
Router# copy running-config startup-config
Router# disable
Router>

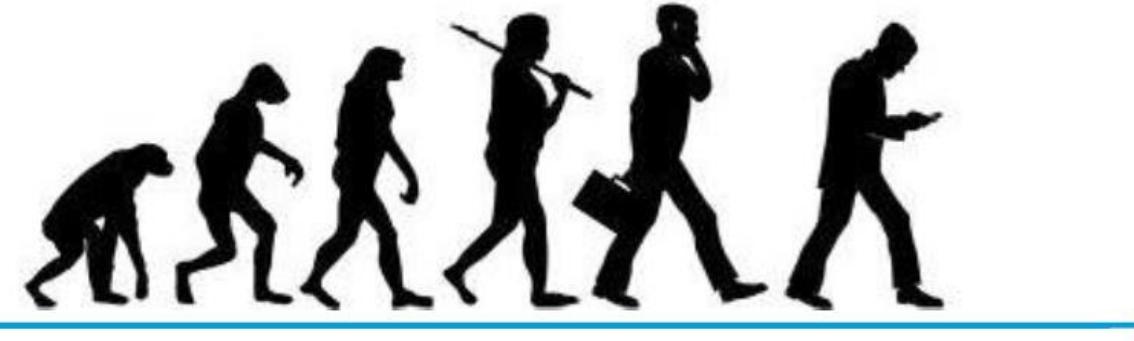
```

Terminal Protocol: **SSH**

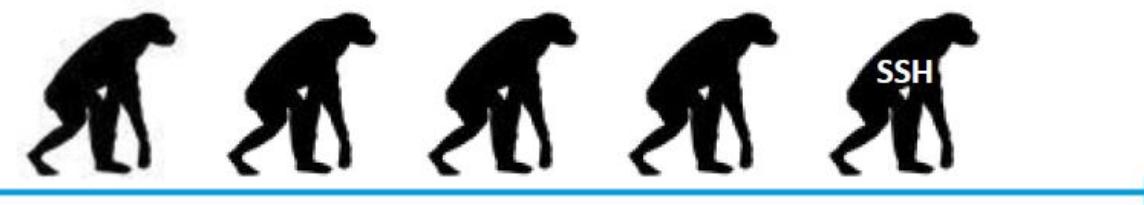
Logfile of HijackThis v1.7.0  
Scan saved at 09:36:29, on  
Platform: Windows XP SP2  
MSIE: Internet Explorer v6.0

Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evn.dll  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Taskbar\Taskbar.exe  
C:\WINDOWS\system32\spooler.exe  
C:\Program Files\Fichiers\Kerio\Peers\Peers.exe  
C:\Program Files\Norton AntiVirus\Norton AntiVirus.exe  
C:\Program Files\Norton AntiVirus\Norton AntiVirus.exe  
C:\Program Files\Norton AntiVirus\Norton AntiVirus.exe  
C:\Program Files\Fichiers\Kerio\Peers\Peers.exe  
C:\Program Files\Fichiers\Kerio\Peers\Peers.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers\Kerio\Peers\Peers.exe  
C:\WINDOWS\system32\Ati2evn.dll  
C:\Program Files\Fichiers\communs\Symantec Shared\ccEvtMgr.exe  
C:\WINDOWS\Explorer.EXE  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft\Windows\Windows Media\Windows Media Player\wmplayer.exe  
C:\Program Files\Lavasoft\Lavasoft Toolbar\lvt.exe  
C:\Program Files\Fichiers\Kerio\Peers\Peers.exe  
C:\Program Files\QuickTime\QTKit\QTKit.exe  
C:\Program Files\Logitech\Logitech Software\Gaming\Gaming.exe  
C:\Program Files\MSN Messenger\msn.exe  
C:\Program Files\SAGEM\SAgent\SAgent.exe  
C:\Program Files\WinZip\WinZip.exe  
C:\Program Files\Kerio\Peers\Peers.exe  
C:\WINDOWS\system32\LVCom2.dll  
C:\Program Files\Logitech\Logitech Software\Gaming\Gaming.exe  
C:\Program Files\Internet Explorer\iexplore.exe  
C:\Program Files\Outlook\outlook.exe

## COMPUTE EVOLUTION



## NETWORKING EVOLUTION



Compute



Storage



Network



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.1800)  
Run Task: Tasklist  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\System32\winlogon.exe  
C:\WINDOWS\System32\services.exe  
C:\WINDOWS\System32\spoolsv.exe  
C:\WINDOWS\System32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\System32\spoolsv.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe  
C:\Program Files\Kaspersky\Kaspersky Internet Security\kpif4ss.exe  
C:\Program Files\Kaspersky\Kaspersky Internet Security\kpif4ss.exe  
C:\Program Files\Norton AntiVirus\IWP\NPFIHntor.exe  
C:\Program Files\Norton AntiVirus\AdvTools\NPROTECT.EXE  
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrvc.exe  
C:\Program Files\Kaspersky\Kaspersky Internet Security\kpif4gui.exe  
C:\Program Files\Kaspersky\Kaspersky Internet Security\kpif4gui.exe  
C:\Program Files\Symantec Shared\SPBBC\SPBBCSvc.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\System32\Ati2evxx.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccEvtMgr.exe  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe  
C:\Program Files\Logitech\Video\logigrlm.exe  
C:\Program Files\MSN Messenger\msnmgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kaspersky\Kaspersky Internet Security\kpif4gui.exe  
C:\WINDOWS\System32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimn.exe

# In terms of Deployment SDN is Slightly different for:

- Service Provider

- Data Center

- Enterprise

- Campus networks

- Cloud

- WAN and Metro Links

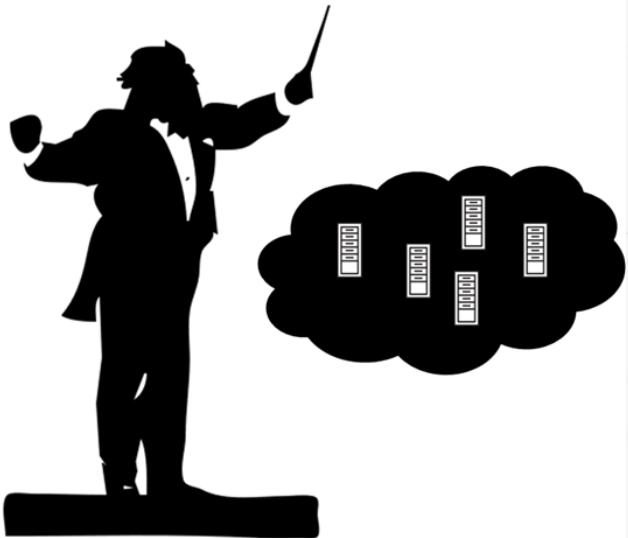
LogFile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer 6.00 SP2 (6.00.2900.2150)  
Run Task Manager: 0  
C:\WINDOWS\System32\cmd.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\spooler.exe  
C:\WINDOWS\System32\spoolsv.exe  
C:\WINDOWS\System32\spooler.exe  
C:\Program Files\Start Menu\Programs\Windows  
C:\WINDOWS\system32\spooler.exe  
C:\Program Files\Firefox\firefox.exe  
C:\Program Files\Keyboard\Keyboard.exe  
C:\Program Files\Notepad\Notepad.exe  
C:\Program Files\Notepad\Notepad.exe  
C:\Program Files\Notepad\Notepad.exe  
C:\Program Files\Find\Find.exe  
C:\Program Files\Keyboard\Keyboard.exe  
C:\Program Files\Find\Find.exe  
C:\WINDOWS\System32\spooler.exe  
C:\Program Files\Keyboard\Keyboard.exe  
C:\WINDOWS\system32\spooler.exe  
C:\Program Files\Find\Find.exe  
C:\WINDOWS\Explorer.exe  
C:\WINDOWS\SOUNDMAN\soundman.exe  
C:\Program Files\Microsoft\Windows  
C:\Program Files\Let's Encrypt\letsencrypt.exe  
C:\Program Files\Firefox\firefox.exe  
C:\Program Files\QuickTime\QuickTime.exe  
C:\Program Files\Logic\Logic.exe  
C:\Program Files\HCL\HCL.exe  
C:\Program Files\SAO\SAO.exe  
C:\Program Files\WinRAR\WinRAR.exe  
C:\Program Files\Keyboard\Keyboard.exe  
C:\WINDOWS\system32\spooler.exe  
C:\Program Files\Logic\Logic.exe  
C:\Program Files\Logic\Logic.exe  
C:\Program Files\Outlook\Outlook.exe

# Ok, please tell me what is SDN, Please...



© HBO / DRnPhoto Jaimie Trueblood

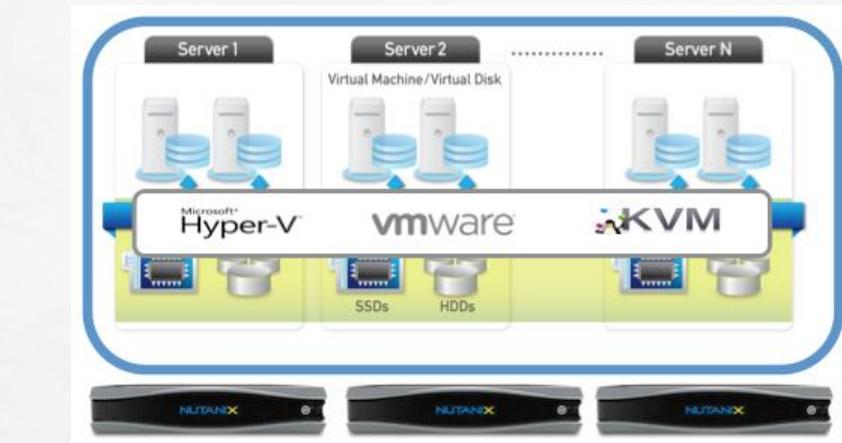
# Orchestration



# Programmabilit



# Hypervisors



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

# How did Amazon AWS build its cloud?

AWS API (EC2, S3, ...)

**Programmability**

Amazon Orchestration Software

**Orchestration**

Open Source Xen Hypervisor

**Hypervisors**

Networking

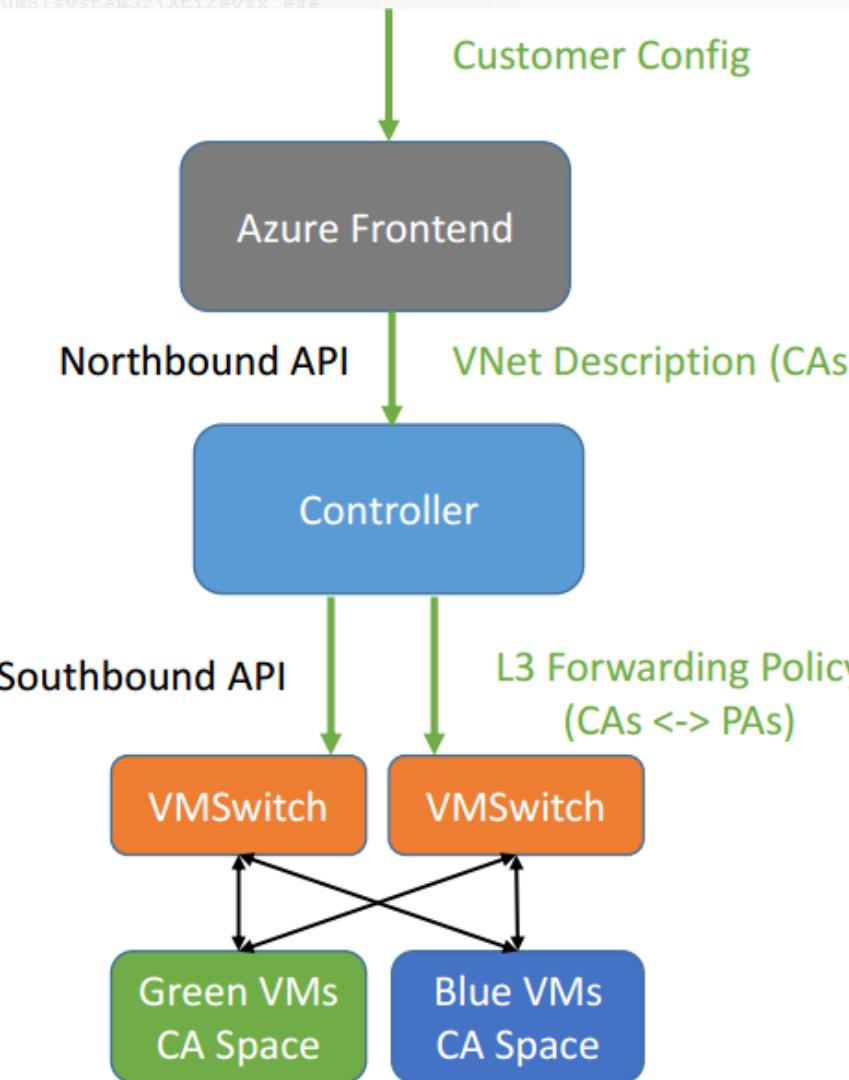
Commodity  
Servers

Commodity  
Storage



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

# How Microsoft build its cloud?



```
Logfile of HijackThis v1.99.1
Scan saved at 09:36:29, on 28/04/2009
Platform: Windows XP SP2 (WinNT 5.01.2600)
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Runn
C:\Windows\system32\cmd.exe
C:\WINDOWS\system32\winlogon.exe
C:\WINDOWS\system32\services.exe
C:\WINDOWS\system32\lsass.exe
C:\WINDOWS\system32\Ati2evxx.exe
C:\WINDOWS\system32\svchost.exe
C:\WINDOWS\system32\svchost-
C:\Program Files\WindowBlinds\wblload.exe
C:\WINDOWS\system32\spoolsv.exe
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe
C:\Program Files\Kerio\Personal Firewall 4\kpf4ss.exe
C:\Program Files\Norton AntiVirus\navapsvc.exe
C:\Program Files\Norton AntiVirus\IWP\NPFIHntor.exe
C:\Program Files\Norton AntiVirus\AdvTools\NPROTECT.EXE
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrvc.exe
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe
C:\Program Files\Fichiers communs\Symantec Shared\SPBBC\SPBBCSvc.exe
C:\WINDOWS\system32\Ati2evxx.exe
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC
C:\WINDOWS\system32\Ati2evxx.exe
C:\Program Files\Fichiers communs\Symantec Shared\ccEvtMgr
C:\WINDOWS\Explorer.EXE
C:\WINDOWS\system32\Point\point32.exe
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe
C:\Program Files\QuickTime\qttask.exe
C:\Program Files\Logictech\Video LumiTrek.exe
C:\Program Files\Norton AntiVirus\Norton AntiVirus
C:\Program Files\SAGE\SAGEII\fdst 800-840\dsimons.exe
C:\Program Files\WinZip\WZQKPICK.EXE
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe
C:\WINDOWS\system32\LVComS
C:\Program Files\Internet Explorer\IEXPLORE.EXE
C:\Program Files\Outlook Express\msimn.exe
```

# How companies can build their SDN network?

- **Vmware NSX**



- **Openstack**



- **Cisco ACI**



# Microsoft

- **CloudStack**

# cloudstack

- **Juniper Contrail**



- **Microsoft azure pack**

(cloud) OPENCONTRAIL

- **There are some more...**

LogFile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer 6.00 SP1 (6.00.2900.2180)  
Run:

C:\WINDOWS\system32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\AtiZevxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\St  
C:\WINDOWS\system3  
C:\Program Files\K  
C:\Program Files\N  
C:\Program Files\N  
C:\Program Files\N  
C:\Program Files\N  
C:\Program Files\T  
C:\Program Files\K  
C:\Program Files\T  
C:\WINDOWS\System3  
C:\Program Files\T  
C:\WINDOWS\system3  
C:\Program Files\T  
C:\WINDOWS\Explor  
C:\WINDOWS\SOUNDMA  
C:\Program Files\MI  
C:\Program Files\LI  
C:\Program Files\T  
C:\Program Files\Q  
C:\Program Files\LI  
C:\Program Files\N  
C:\Program Files\SI  
C:\Program Files\W  
C:\Program Files\K  
C:\WINDOWS\system3  
C:\Program Files\LI  
C:\Program Files\I  
C:\Program Files\O

# Now let's see the magic



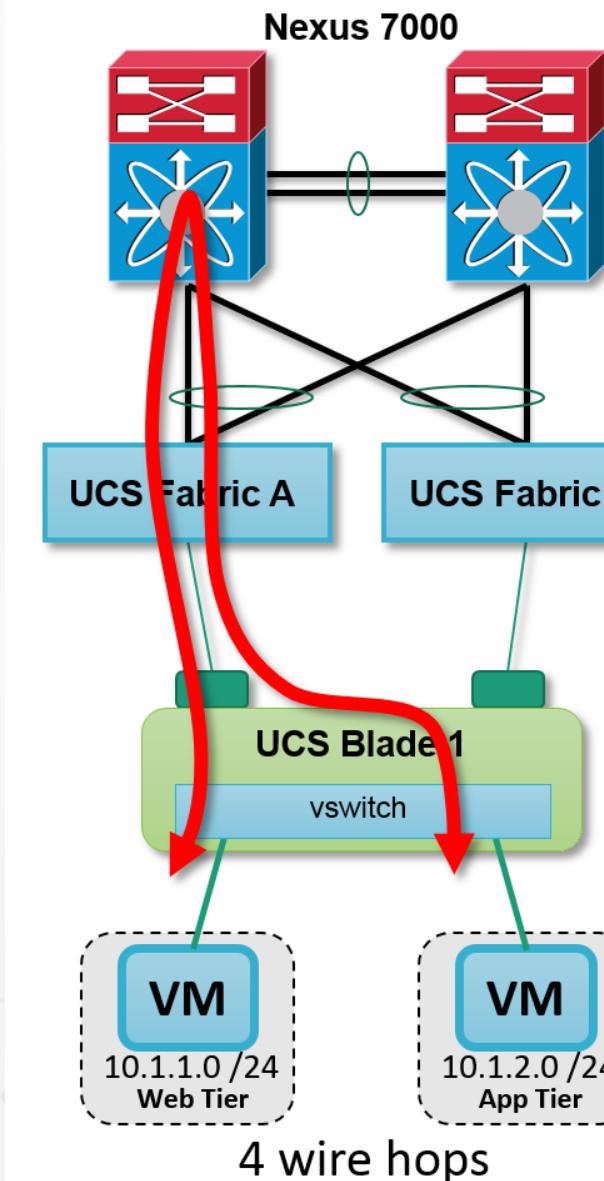
Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Richies\comm\Shared\ccSetMgr.exe  
C:\Program Files\Richies\comm\Shared\ccEvtMgr.exe  
C:\Program Files\Richies\comm\Shared\ccEvtMgr.exe  
C:\Program Files\Norton AntiVirus\IWP\NPFImonitor.exe  
C:\Program Files\Norton AntiVirus\AdvTools\NPROTECT.EXE  
C:\Program Files\Richies\comm\Symantec Shared\SNDSrvc.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\Program Files\Richies\comm\Symantec Shared\SPBBC\SPBBCSVC.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Richies\comm\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\system32\ccEvtMgr.exe  
C:\WINDOWS\Explorati...  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\Richies\comm\Symantec Shared\ccApp.exe  
C:\Program Files\QuickTime\qttask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\WINDOWS\system32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimian.exe

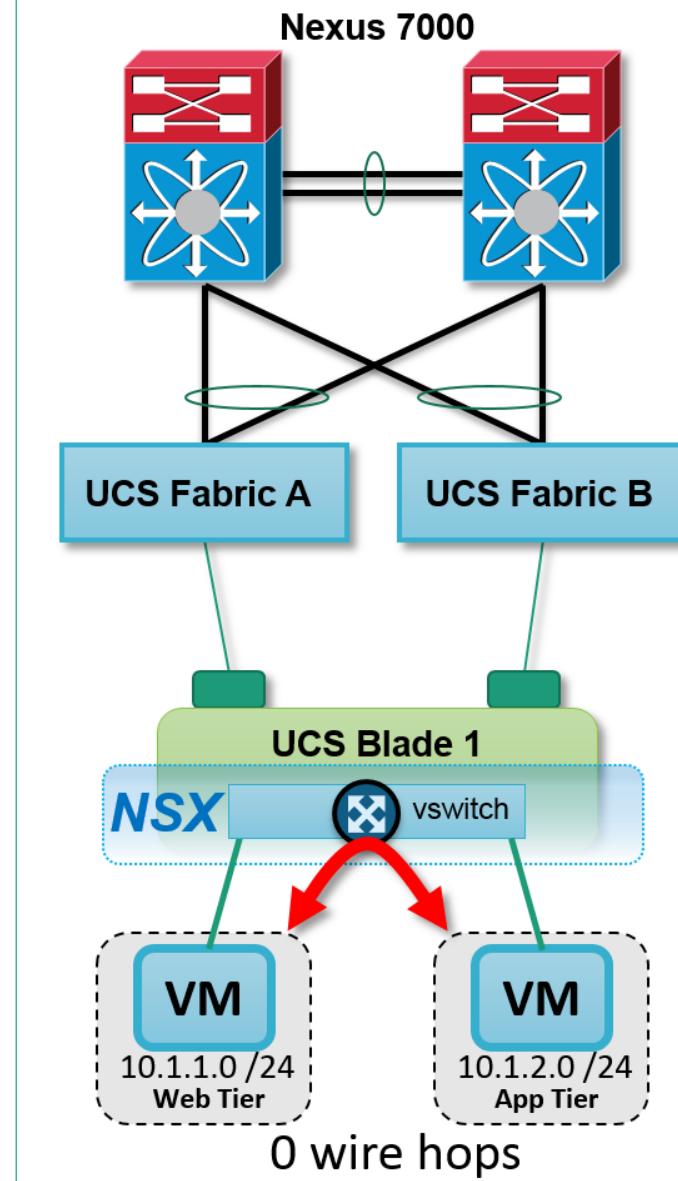
# Before/After SDN

## East-West Layer 3 / Same host

### Before NSX



### With NSX Distributed Logical Routing



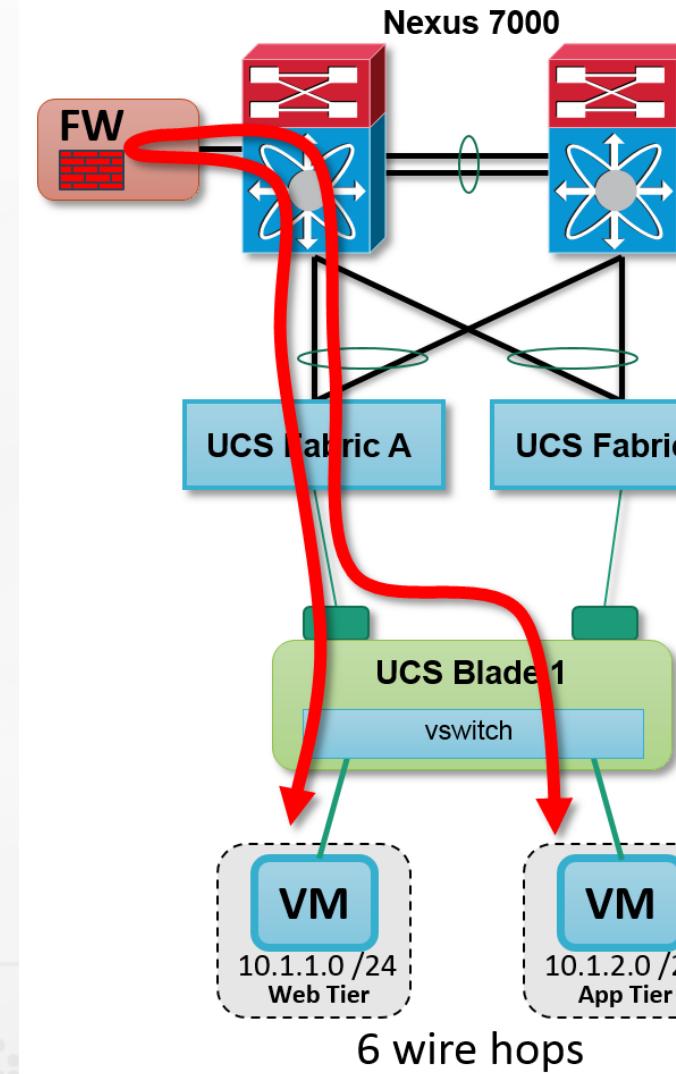
Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Norton AntiVirus\comm\Shared\ccSetMgr.exe  
C:\Program Files\Norton AntiVirus\AdvTools\NPROTECT.EXE  
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrv.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\Program Files\Fichiers communs\Symantec Shared\SPBBC\SPBBCSVC.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\system32\ccEvtMgr.exe  
C:\WINDOWS\Explorati...  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe  
C:\Program Files\QuickTime\qttask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\WINDOWS\system32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimian.exe

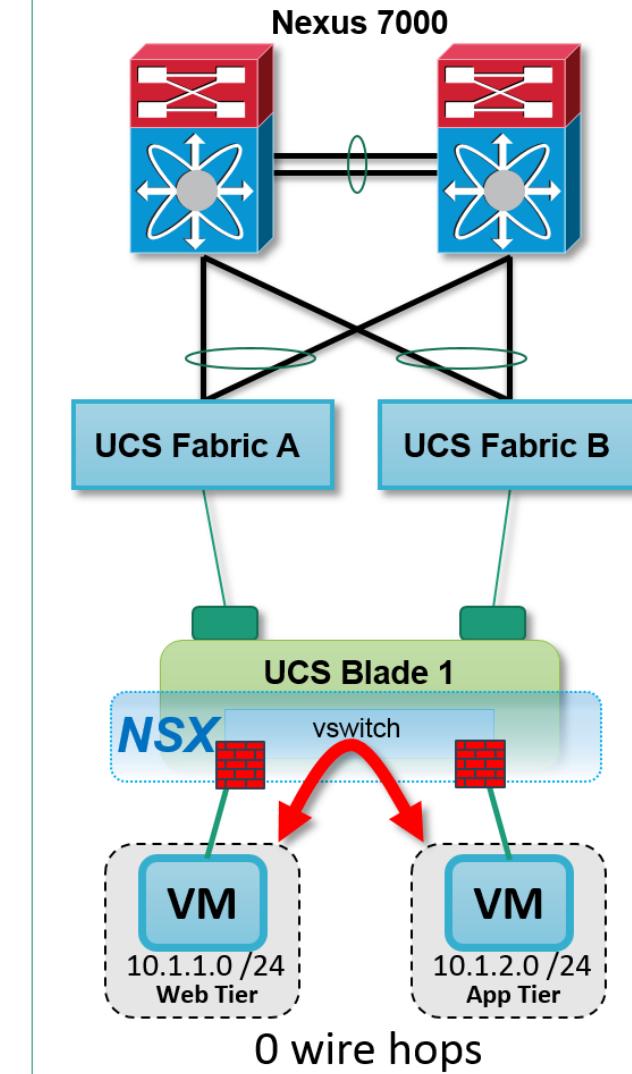
# Before/After SDN

## East-West Firewalling / Same host

### Before NSX



### With NSX Distributed Virtual Firewall

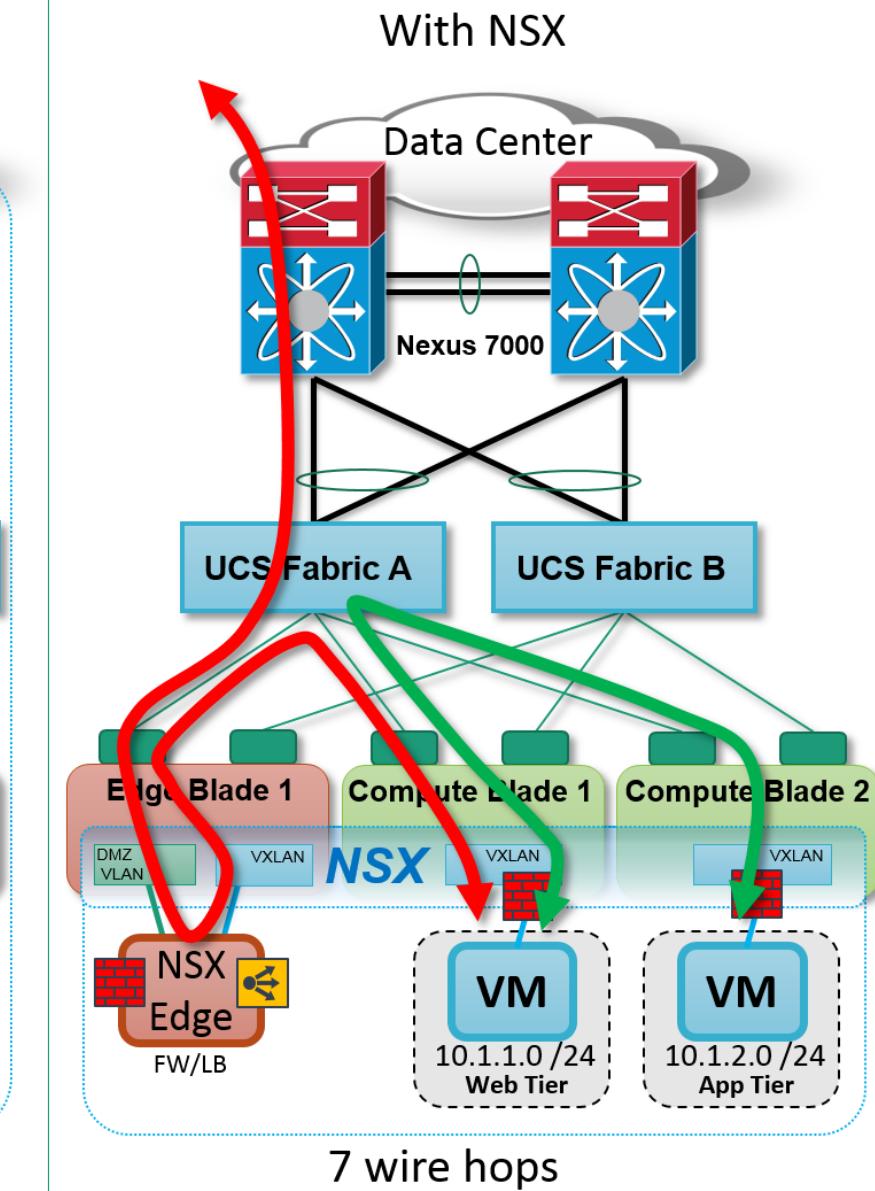
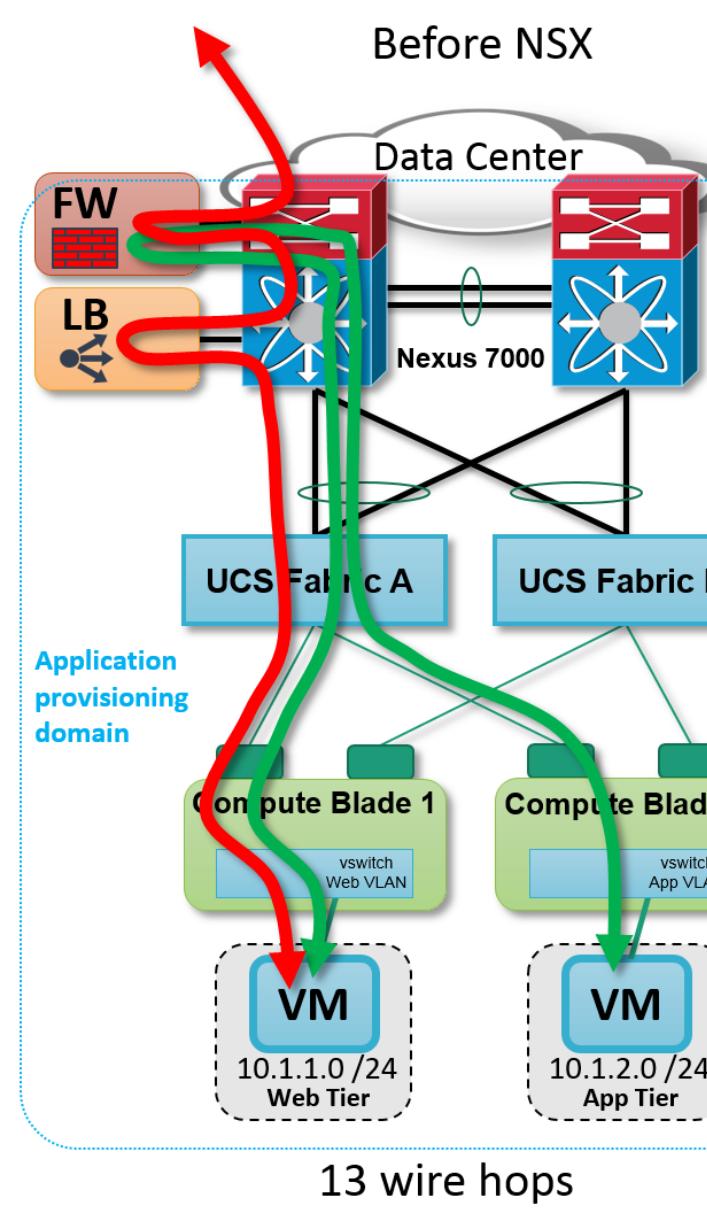


Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

# Before/After SDN

Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\AtiEvxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Norton AntiVirus\IWP\NPFIManager.exe  
C:\Program Files\Norton AntiVirus\AdvTools\NPROTECT.EXE  
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrv.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\Program Files\Fichiers communs\Symantec Shared\SPBBC\SPBBC  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\syn  
C:\WINDOWS\system32\l2l2.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccEvtMgr.exe  
C:\WINDOWS\Explorati...  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.e  
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe  
C:\Program Files\QuickTime\qttask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\WINDOWS\system32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimian.exe

## North-South & East-West Traffic Flow

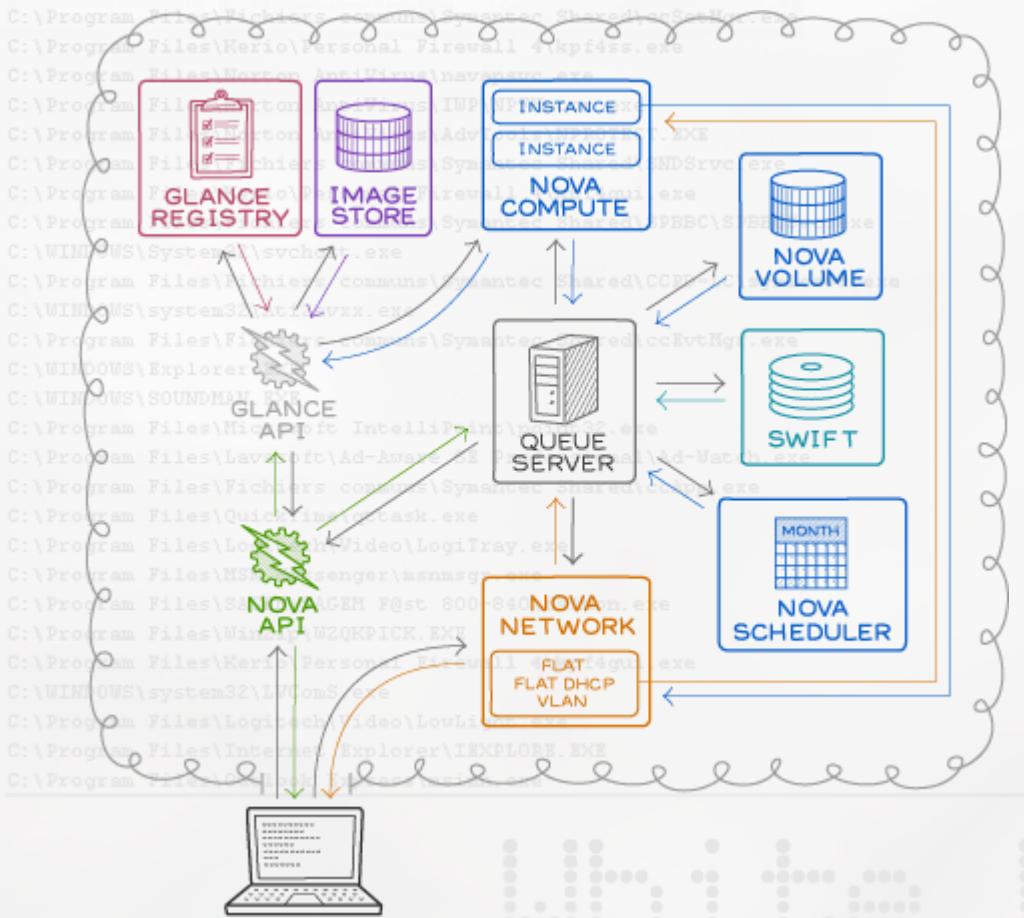


Logfile of HijackThis v1.26.1  
Scan saved: 2009-04-04 2009  
Platform: Windows 7 (6.1.7601.17514)  
NSIE: Internet Explorer 8.0.600.2180

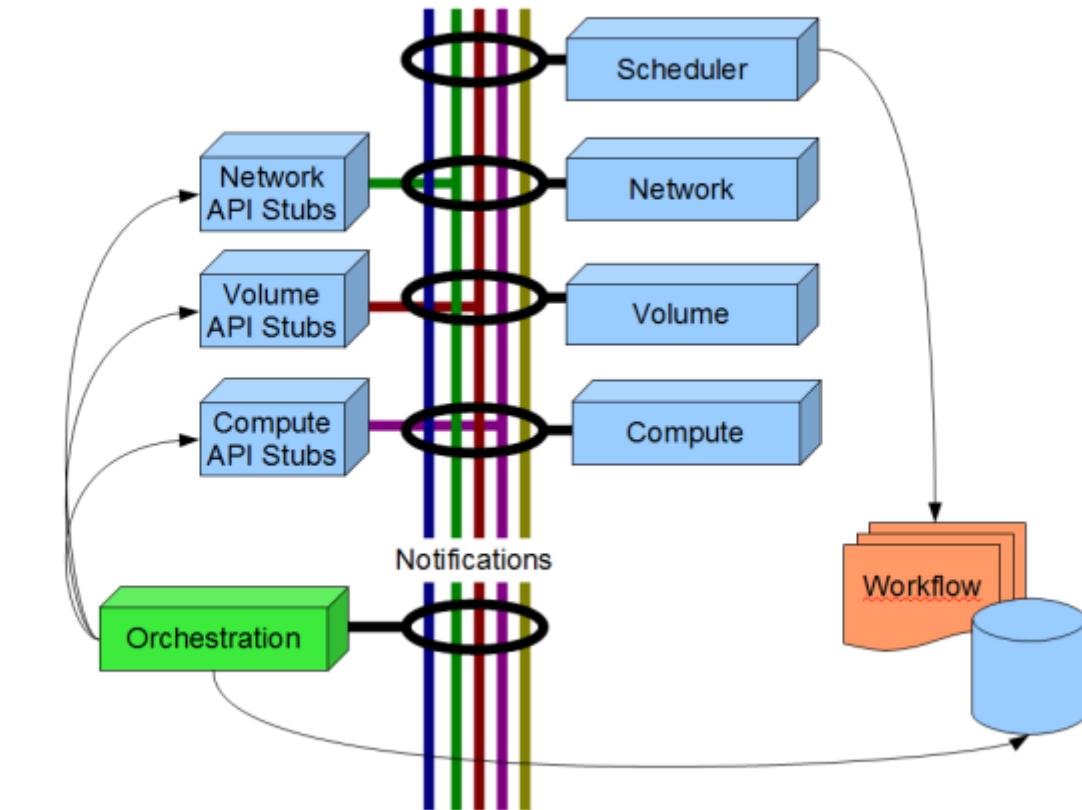


openstack™

C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe



### RabbitMQ Queues



LogFile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4ss.exe  
C:\Program Files\Norton AntiVirus\navapsvc.exe  
C:\Program Files\Norton AntiVirus\IWP\NPFMntor.exe  
C:\Program Files\Norton AntiVirus\AdvTools\NPFMntor.EXE  
C:\Program Files\Norton AntiVirus\NPFMntor.exe  
C:\Program Files\Norton AntiVirus\NPFMntor.exe  
C:\Program Files\Norton AntiVirus\NPFMntor.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccEvtMgr.exe  
C:\WINDOWS\Explorer.EXE  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe  
C:\Program Files\QuickTime\qtask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\WINDOWS\System32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimian.exe

# Micro-Segmentation using SDN

White Hat Hack

Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (WinNT 5.01.2600)

# Before SDN

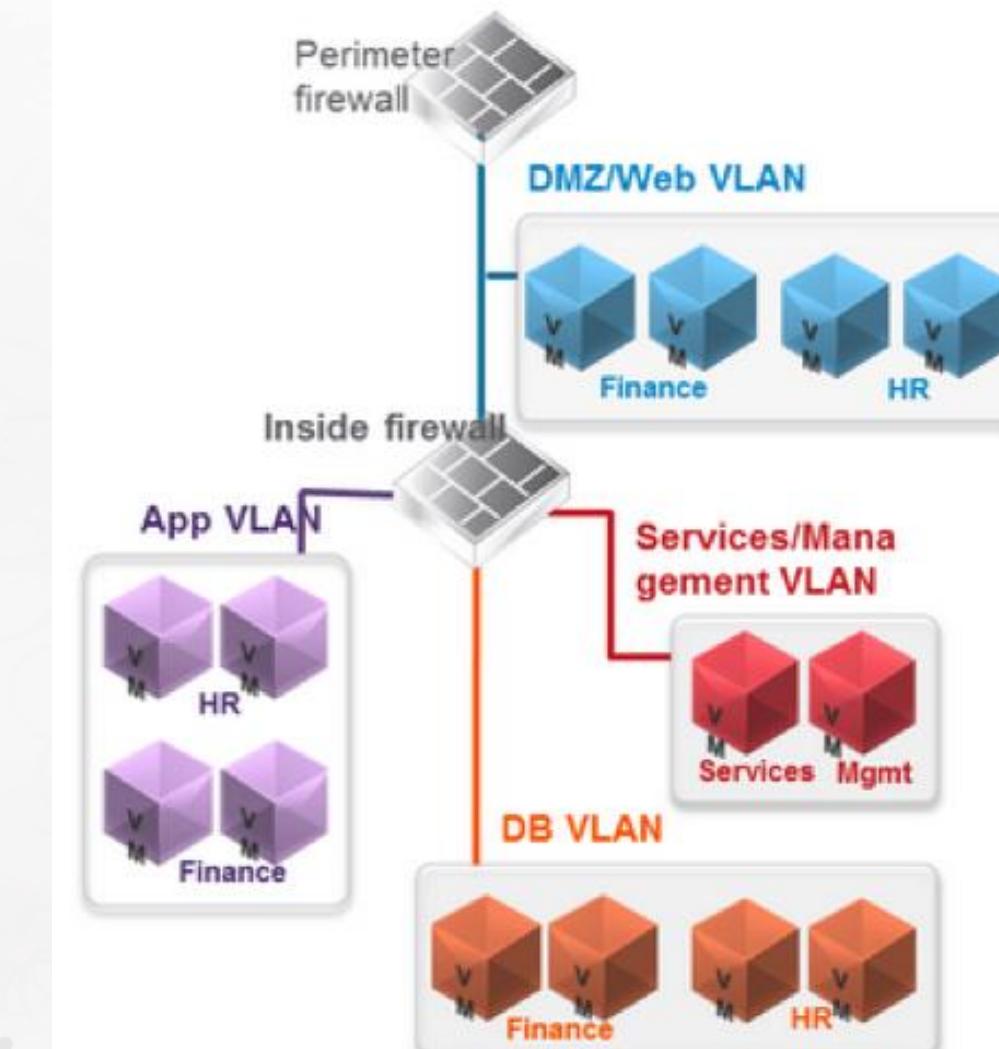
- Vlan oriented

- Choke points

- Unmanageable

- Big attack surface

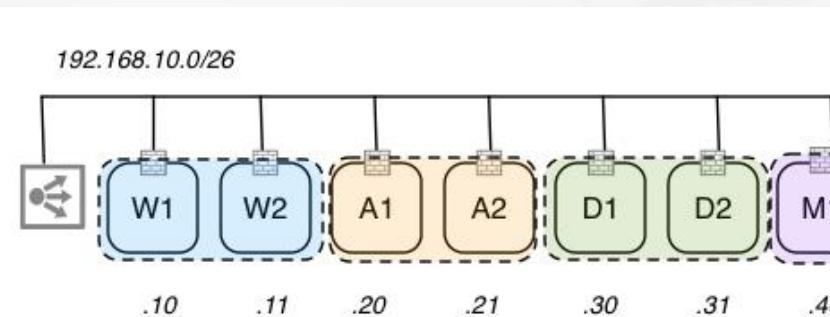
## Traditional Data Center



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Microsoft Internet Explorer v6.0.2900.2180

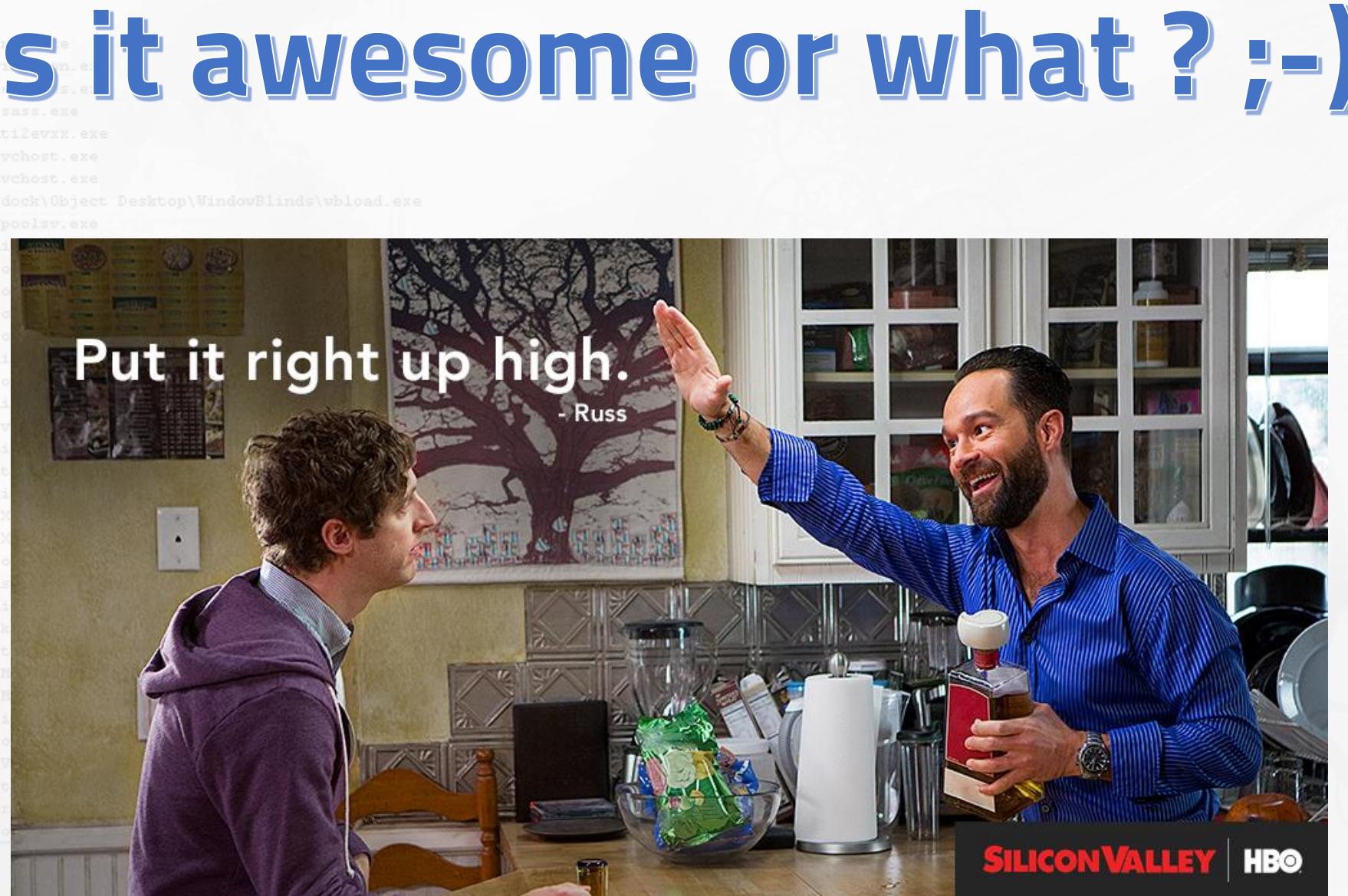
# After SDN

- Smaller attack surface, small domains
- Distributed Firewall
- Hypervisor's in-kernel L2/L3/FW
- Simplified deployment



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:  
C:\WINDOWS\System32\RPCRT4.dll  
C:\WINDOWS\system32\ole32.dll  
C:\WINDOWS\system32\RPC.dll  
C:\WINDOWS\system32\oleaut32.dll  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\RichEdit.dll  
C:\Program Files\Kerio\Kerio Connect\Kerio Connect.exe  
C:\Program Files\Norton\Norton Internet Security\Norton Internet Security.exe  
C:\Program Files\Norton\Norton Internet Security\Norton Internet Security.exe  
C:\Program Files\Norton\Norton Internet Security\Norton Internet Security.exe  
C:\Program Files\RichEdit.dll  
C:\Program Files\Kerio\Kerio Connect\Kerio Connect.exe  
C:\Program Files\RichEdit.dll  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\RichEdit.dll  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\Program Files\RichEdit.dll  
C:\WINDOWS\Explorer.EXE  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft\Windows\Windows Media\Windows Media Player\wmplayer.exe  
C:\Program Files\Lavasoft\Anti-Spyware\AS.exe  
C:\Program Files\RichEdit.dll  
C:\Program Files\QuickTime\QTKit.dll  
C:\Program Files\LoginVista\LoginVista.exe  
C:\Program Files\MSN\MSN.exe  
C:\Program Files\SAGE\SAF.exe  
C:\Program Files\WinZip\WinZip.exe  
C:\Program Files\Kerio\Kerio Connect\Kerio Connect.exe  
C:\WINDOWS\system32\LV.dll  
C:\Program Files\LoginVista\LoginVista.exe  
C:\Program Files\Internet Explorer\iexplore.exe  
C:\Program Files\Outlook\Outlook.exe



LogFile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

Running processes:

C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Stardock\Object Desktop\WindowBlinds\wbload.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\Program Files\Kerio\Antivirus\SPB\SPB.exe  
C:\Program Files\Kerio\Antivirus\SPB\SPBPRO.exe  
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrvc.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\Program Files\Fichiers communs\Symantec Shared\SPBBC\SPBBCSvc.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccEvtMgr.exe  
C:\WINDOWS\Explorer.EXE  
C:\WINDOWS\SOUNDMAN.EXE  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\Lavasoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccApp.exe  
C:\Program Files\QuickTime\qtask.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\WINDOWS\System32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimn.exe

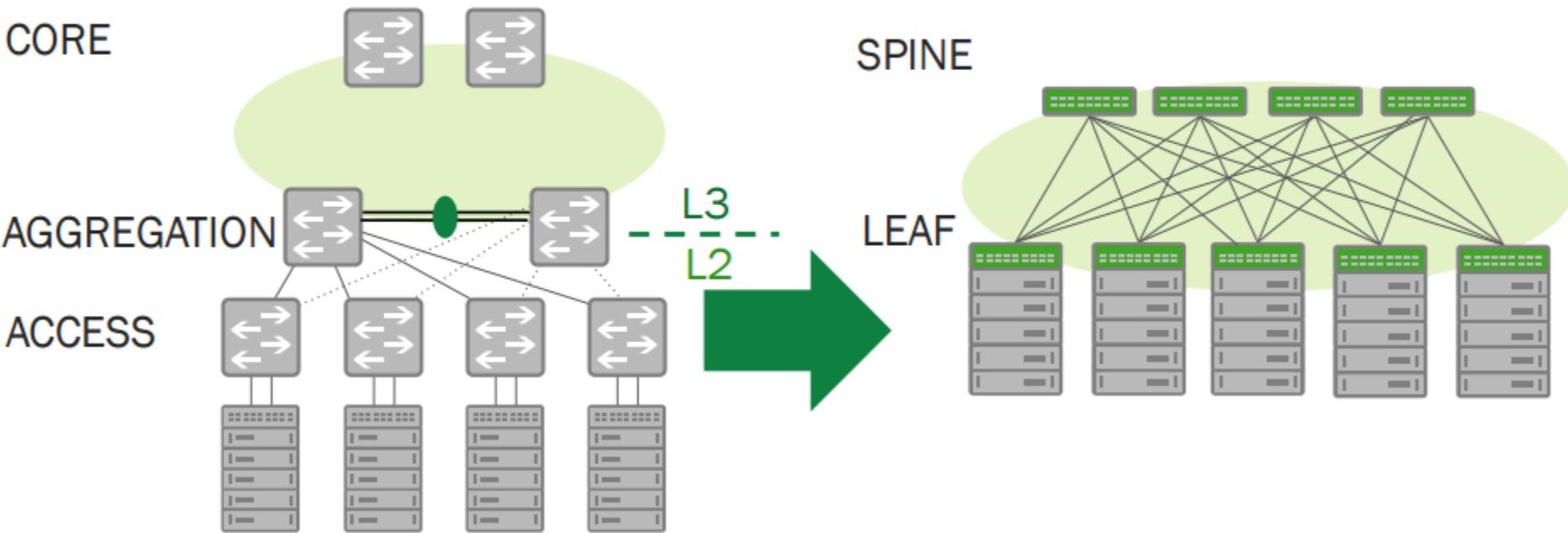
If we have some more time

White Hat Has Been

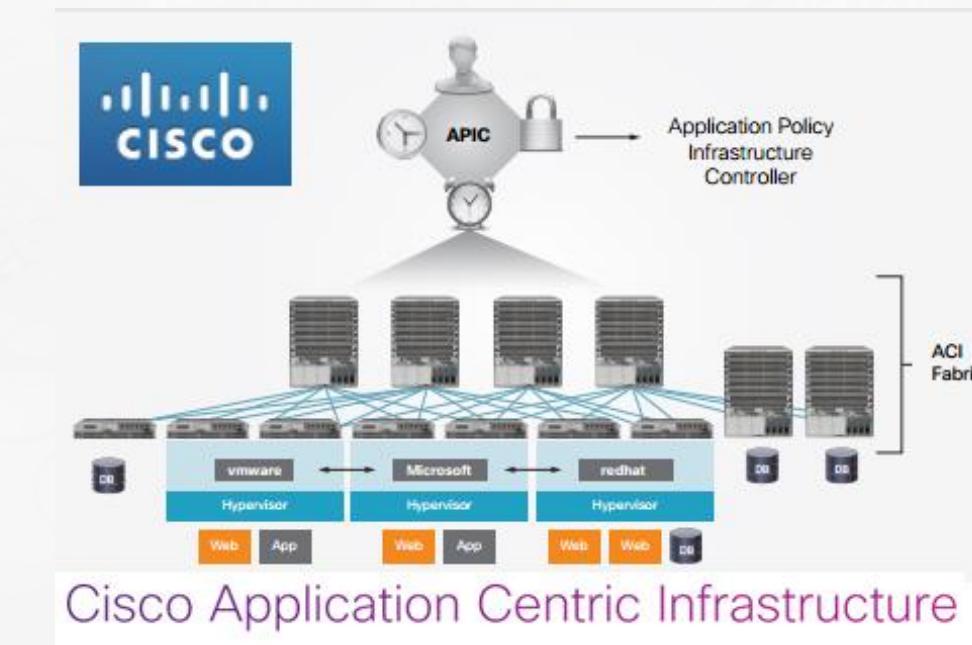
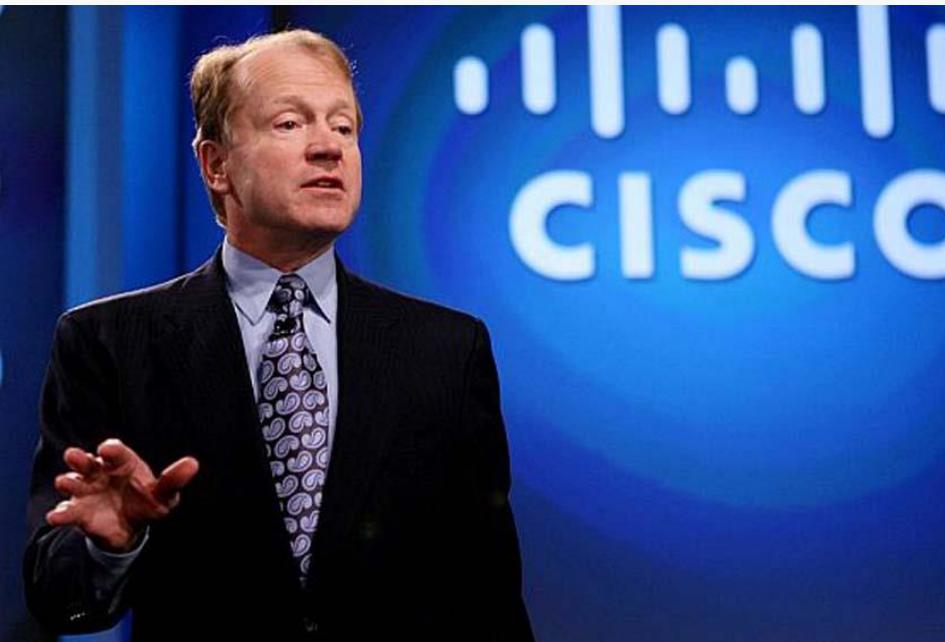
Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer v6.00 SP2 (6.00.2900.2180)

- Nobody care anymore about the underlying networking
- Hypervisor is the new  king!!!

## A Key Transformation



**IMHO, biggest loser would be**



```
LogFile of HijackThis v1.99.1
Scan saved at 09:36:29, on 28/04/2009
Platform: Windows XP SP2 (WinNT 5.01.2600)
MSIE: Microsoft Internet Explorer 00 SP1 (6.0.2900.2180)
```

**IMHO, biggest winner would be**



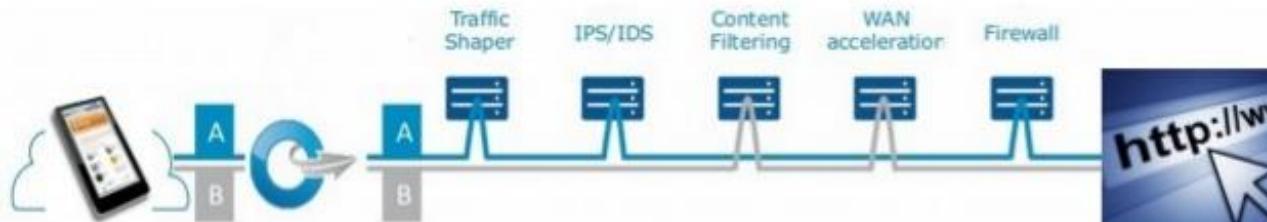
- **Currently VP, GM & CTO in VMware**
- **King of the valley**
- **Nicira was acquired by VMware for \$1.26 billion**
- **Invented the network virtualization**

Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows Vista (winNT 5.0, 32bit)  
MSIE: Internet Explorer 7.00.520  
Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\RPCSS.exe

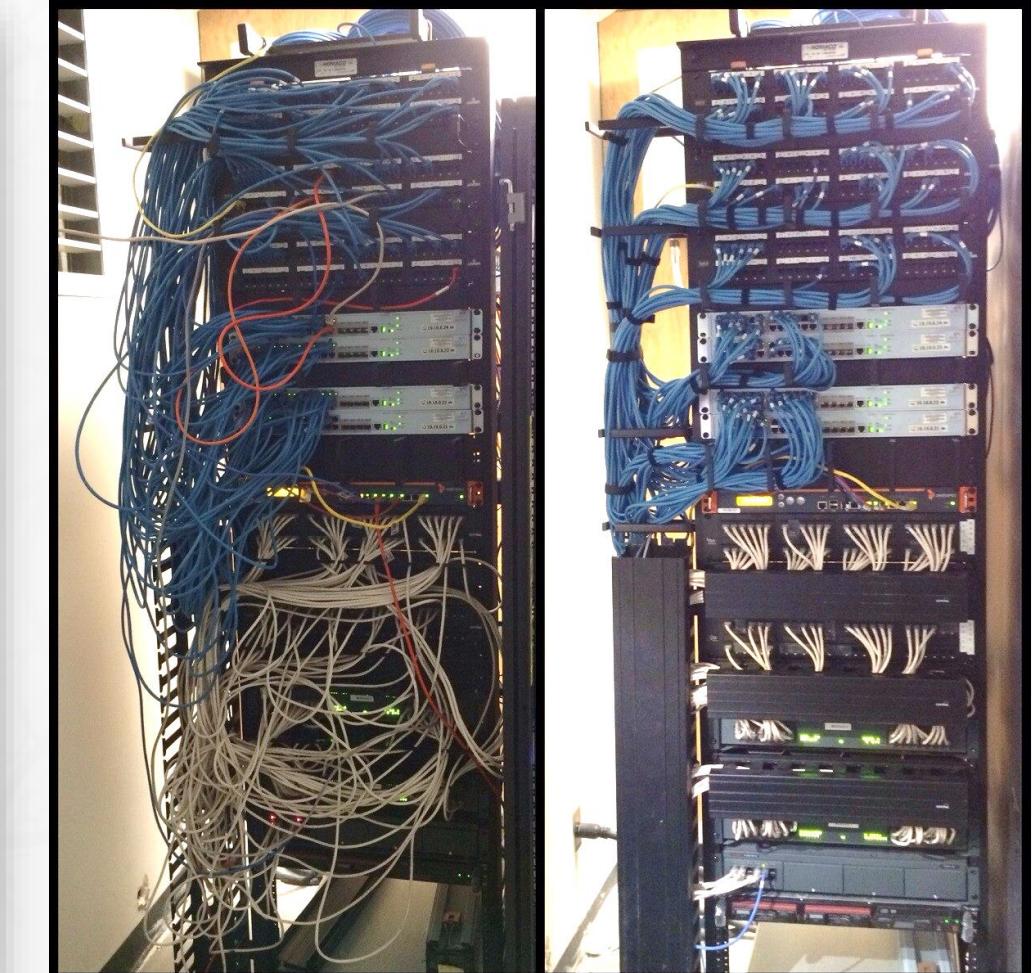
# NFV - Network functions virtualization

## Service Chaining

Moving network functions into software means that building a service chain no longer requires acquiring hardware.



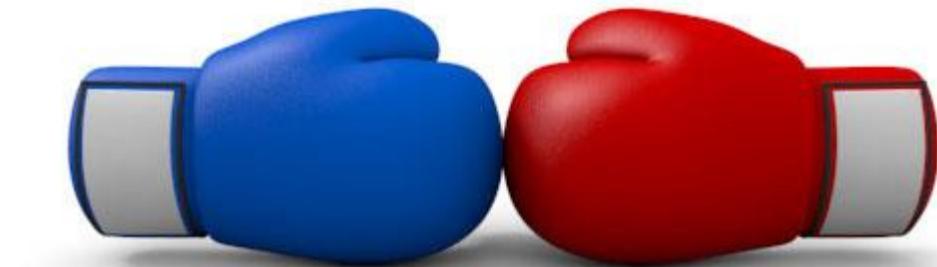
Source: Dynamic Service Chaining, SDN OpenFlow World Congress, Oct 2013, Jan Lindblad, Telia



Logfile of HijackThis v1.99.1  
Scan saved at 09:36:29, on 28/04/2009  
Platform: Windows XP SP2 (WinNT 5.01.2600)  
MSIE: Internet Explorer 7.0.5723.1180  
Running processes:  
C:\WINDOWS\System32\smss.exe  
C:\WINDOWS\system32\winlogon.exe  
C:\WINDOWS\system32\services.exe  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\WINDOWS\system32\svchost.exe  
C:\WINDOWS\system32\spoolsv.exe  
C:\Program Files\Fichiers communs\Symantec Shared\ccSetMgr.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4ss.exe  
C:\Program Files\Kerio\Personal Firewall 4\kpf4ui.exe  
C:\Program Files\Kaspersky Anti-Virus\AdvTools\NPROTECT.EXE  
C:\Program Files\Fichiers communs\Symantec Shared\SNDSrvc.exe  
C:\Program Files\Kaspersky Anti-Virus\Proxy\Proxy\Proxy.exe  
C:\Program Files\Kaspersky Anti-Virus\Proxy\Proxy\Proxy.exe  
C:\WINDOWS\System32\svchost.exe  
C:\Program Files\Fichiers communs\Symantec Shared\CCPD-LC\synalcsvc.exe  
C:\WINDOWS\system32\Ati2evxx.exe  
C:\Program Files\Microsoft IntelliPoint\point32.exe  
C:\Program Files\JavaSoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\JavaSoft\Ad-Aware SE Professional\Ad-Watch.exe  
C:\Program Files\QuickTime\qtcish.exe  
C:\Program Files\Logitech\Video\LogiTray.exe  
C:\Program Files\MSN Messenger\msnmsgr.exe  
C:\Program Files\SAGEM\SAGEM F@st 800-840\dsimon.exe  
C:\Program Files\WinZip\WZQKPICK.EXE  
C:\Program Files\Kerio\Personal Firewall 4\kpf4gui.exe  
C:\WINDOWS\system32\LVComS.exe  
C:\Program Files\Logitech\Video\LowLight.exe  
C:\Program Files\Internet Explorer\IEXPLORE.EXE  
C:\Program Files\Outlook Express\msimian.exe

# Business Impact

- **Chip hardware - switches, storage, etc..**
- **Smaller physical space, less hardware**
  - **Less operational guys**
- **Fast services for end-users**
  - **Pay as you grow**



## CapEx vs. OpEx

C:\WINDOWS\System32\Any  
C:\WINDOWS\system32\Any  
C:\WINDOWS\system32\Any  
C:\WINDOWS\system32\lsass.exe  
C:\WINDOWS\system32\Ati2evxx.exe

# Any Questions ?

