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Gestione del networking in ambiente Hyper-V cluster e supporto per Live Migration

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Virtual Networking in Hyper-V

Introduzione

Argomenti trattati

- 1. Progettazione del networking in ambiente cluster
- a. Schede di rete necessarie
- b. Rete Live Migration
- c. Rete Cluster Private
- 2. Configurazione delle schede di rete
- 3. Schede di rete usate dai servizi di Failover Cluster
- a. Priorità di gestione
- 4. Novità nel networking di Hyper-V 3.0
- a. Nuove funzionalità dei Virtual Switch
- i. Gestione della banda minima/massima garantita
- b. Supporto per il NIC teaming integrato

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Elemente di una rete

- NIC (Network Interface Card)
  - pNIC (physical NIC)
  - vNIC (virtual NIC)
- Switch
  - Physical switch(es)
  - Virtual switch(es)

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Virtual NIC

- Legacy interface
  - Utilizza un driver emulato
  - Supporta pre-boot execution (PXE)
  - È compatibile con molti sistemi operativi
  - Non suppora sistemi operativi a 64 bit
- Synthetic Interface
  - Richiede Hyper-V integration components
  - Utilizza il synthetic driver stack (VMBus che comunica usando shared memory)
  - Prestazioni migliori
  - Supporta VLAN tagging e altro

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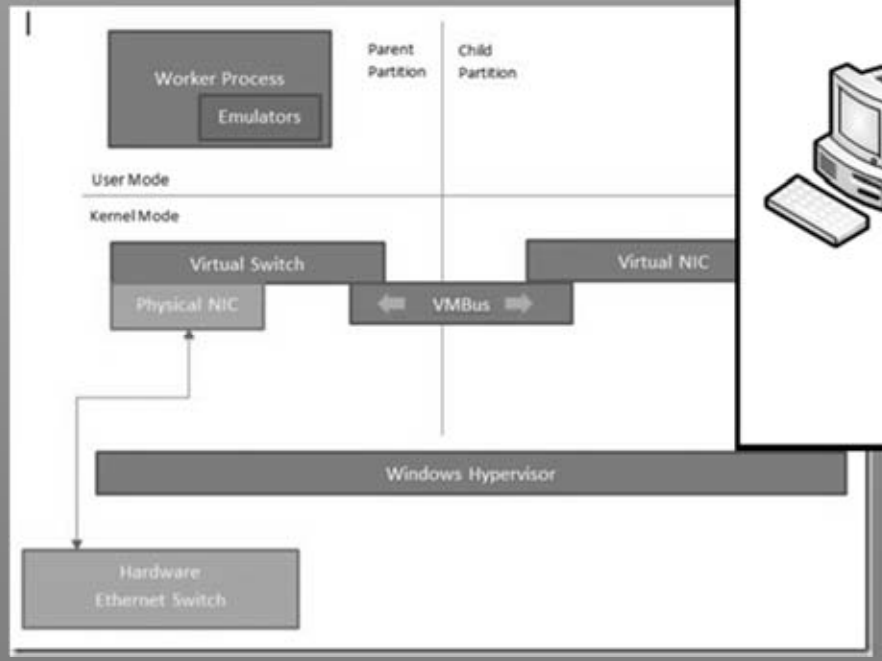
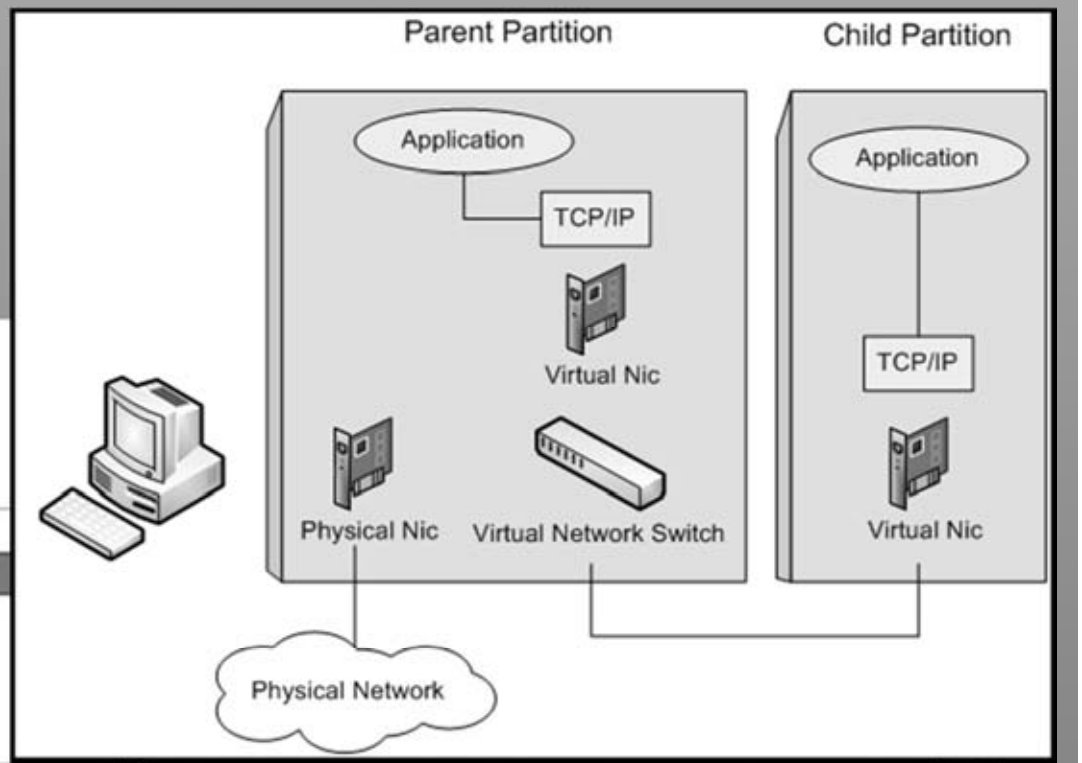
Virtual Switch

- Configurate a livello di Hyper-V
  - External
  - Private
  - Internal





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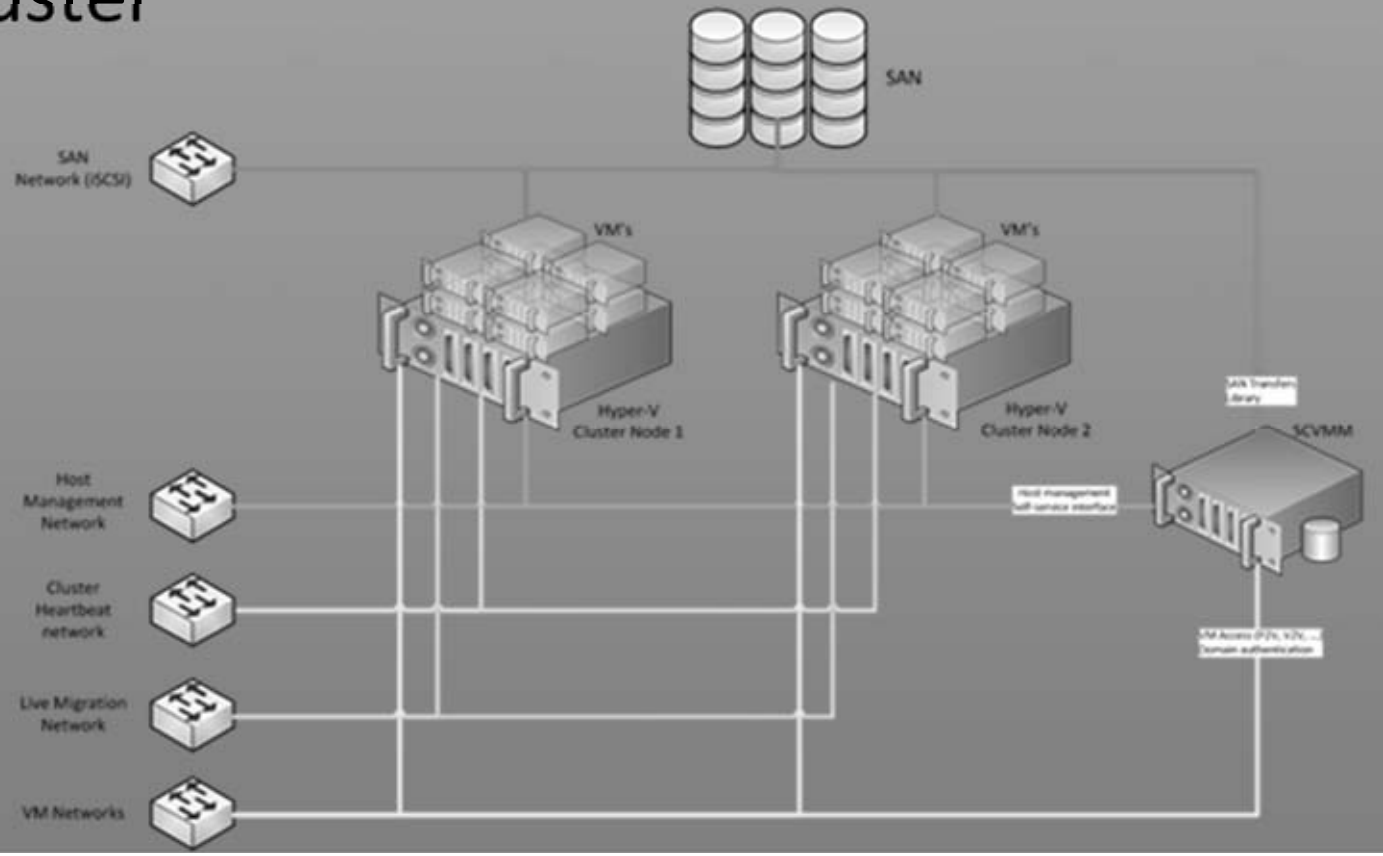
Rete in ambito cluster

- Per le VM solo reti “public”
- Varie nuove reti necessarie alle funzioni del cluster



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Pianificazione

Tipi di reti

- Rete di gestione (Management)
  - Tutto quello che riguarda la parent partition (inclusi i backup)
- Almeno una rete pubblica per le VM
- Rete privata per il Failover Cluster
  - Hearthbeat
- Opzionale
  - Rete privata per Live Migration (LM)
  - Rete privata per il CSV
- Se richiesto: rete per IP storage
  - iSCSI
  - NAS (in Hyper-V3)

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Schede di rete necessarie

Rete	*NIC min*	*NIC best*	*Note*
Gestione	1	1?	Necessaria
VM	1	2 o più	Può essere condivisa con la gestione
Privata	1	1	Necessaria per un cluster
LM	(1)	1	Può essere condivisa con la privata
CSV	(1)	1	Può essere condivisa con la privata
iSCSI	(1)	2 o più	Dipende dallo storage

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Ridondanza delle NIC

- Alcune reti richiedono ridondanza
  - Altre no (come quella di heartbeat)
- Ridondanza -> almeno 2 NIC
- Prestazioni -> molte NIC
- Software di teaming di terze parti
  - Complessi? Sicuramente diversi
  - Integrato in Windows Server 2012… ma…
  - Spesso includono funzioni per creare virtual NIC multiple

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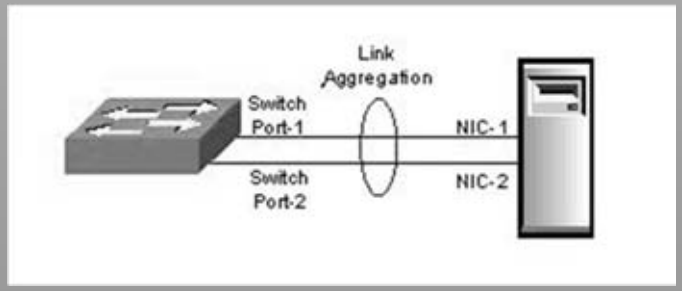
NIC Teaming

- Tipi di teaming
  - Switch independent
    - puro failover
    - “smart”
  - Switch port aggregation
    - 802.3ad, Etherchannel, LAG, …
  - Vero aggregation?
- Quando non vanno usati?
  - Storage iSCSI



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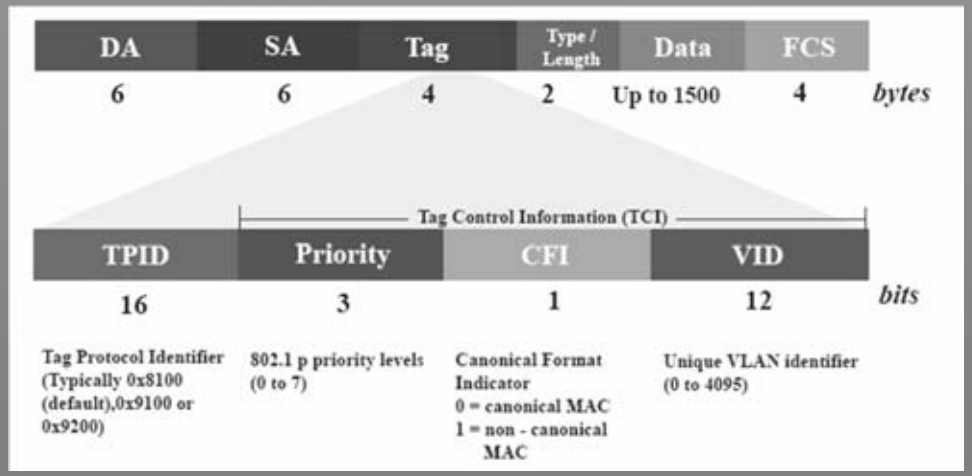
Utilizzo delle VLAN

- Virtual LAN (802.1Q)
  - Più reti logiche (isolate) su una stessa fisica
    - VLAN ID 1-4094
  - Concetto di pNIC virtuale
  - Richiedono configurazione lato switch
- Private VLAN
  - Introdotte con Hyper-V3



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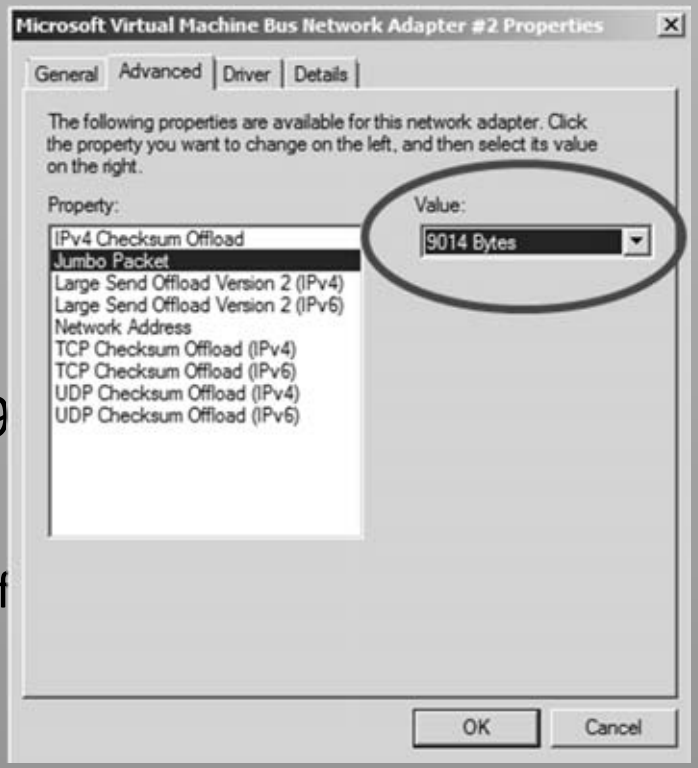
NIC Optimization



- Jumbo Frames
  - Ethernet frames da 1,500 bytes a ~9
    - Aumenta throughput
    - Reduce CPU utilization of large file transf
  - Dove usarlo?
    - iSCSI, LM
  - Considerazioni
- TCP Offload support
  - TCP/IP traffic in a VM can be offloaded to a physical NIC on the host computer
  - Reduce CPU burden
  - Networking offload to improve performance
  - Live Migration is supported with Full TCP Offload

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NIC Optimization

- Virtual Machine Queue (VMQ) Support
- Overview
  - NIC can DMA packets directly into VM memory
    - VM Device buffer gets assigned to one of the queues
    - Avoids packet copies in the VSP
    - Avoids route lookup in the virtual switch (VMQ Queue ID)
  - Allows the NIC to essentially appear as multiple NICs on the physical host (queues)
- Benefits
  - Host no longer has device DMA data in its own buffer resulting in a shorter path length for I/O (performance gain)

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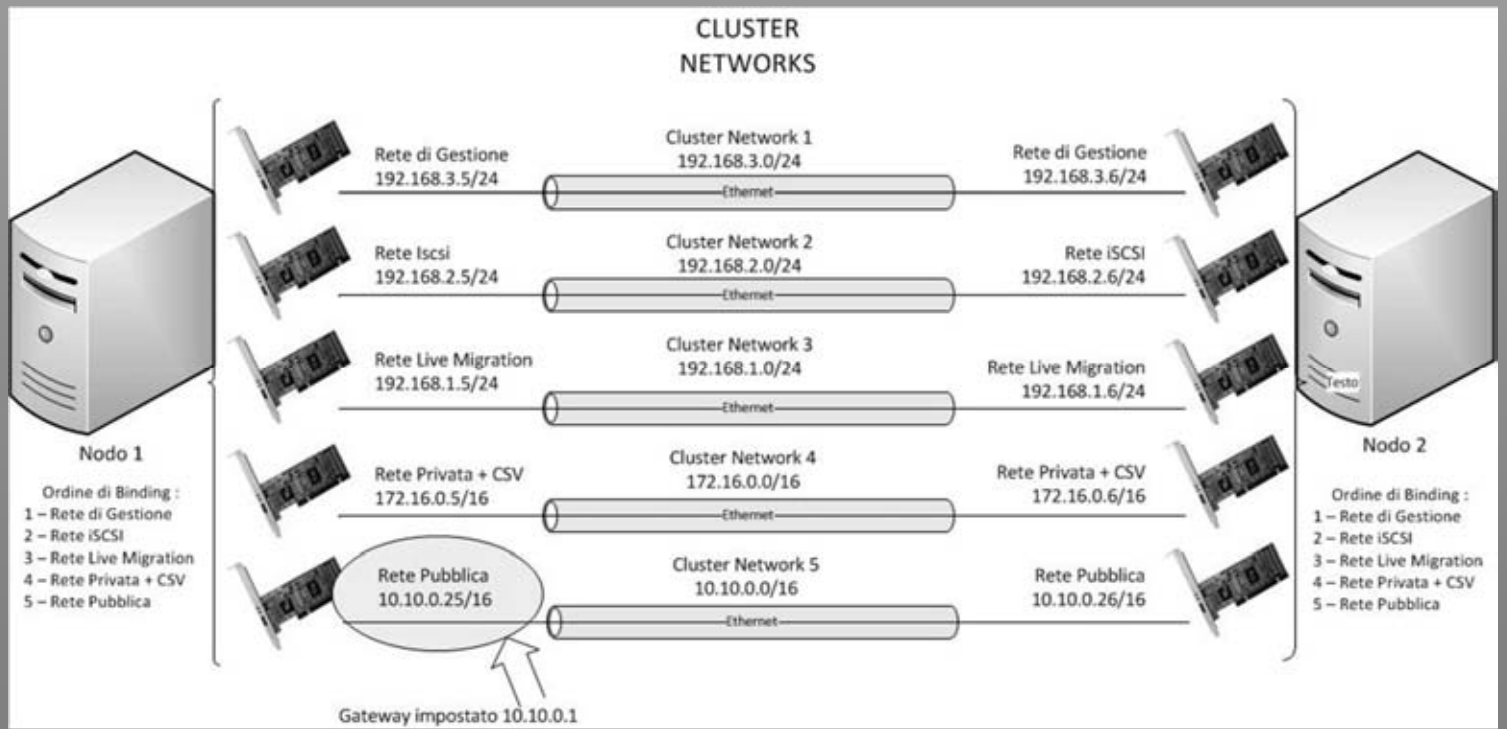
Pianificazione

- Popolare le NIC in modo speculare
- Configurazione di rete speculare
- Configurazione degli IP omogenea
- Rinominare le schede di rete
- Decidere se usare o meno le VLAN



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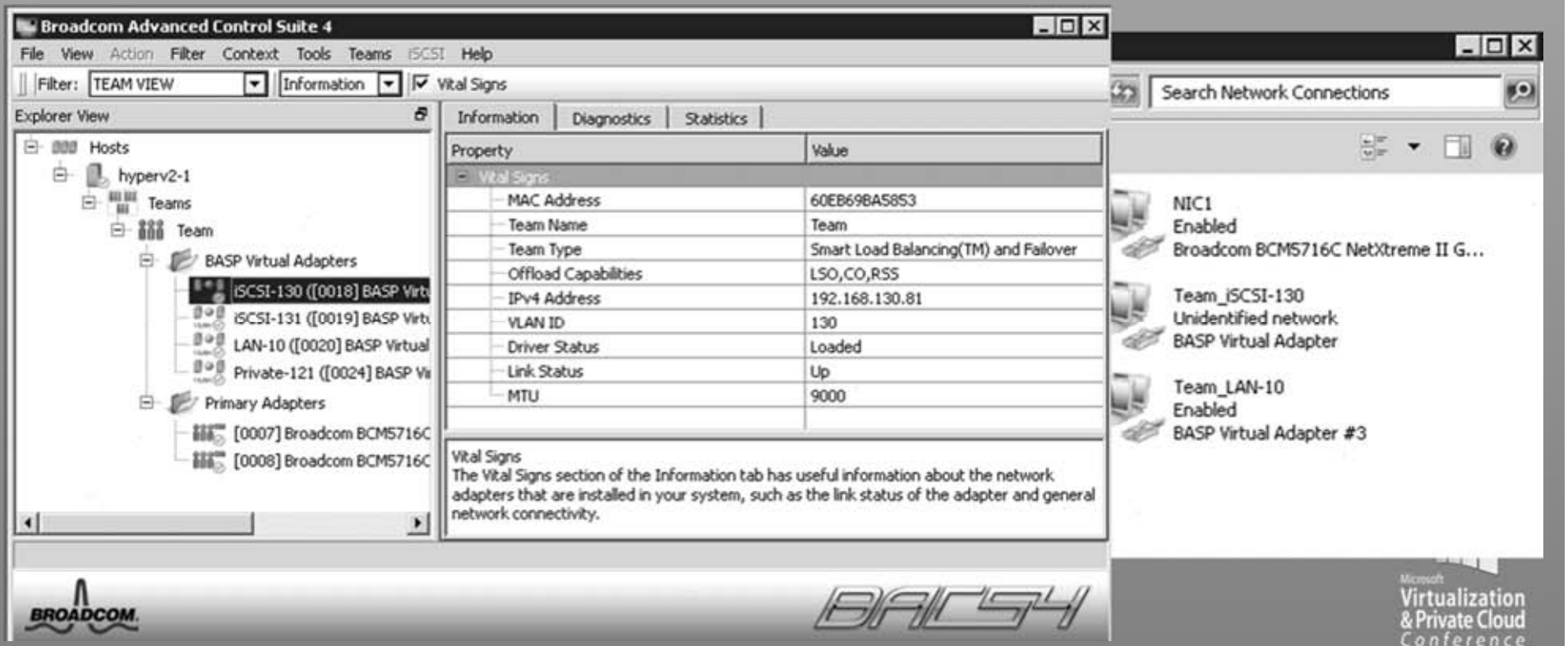
Demo

Virtual Networking in Hyper-V

Implementazione

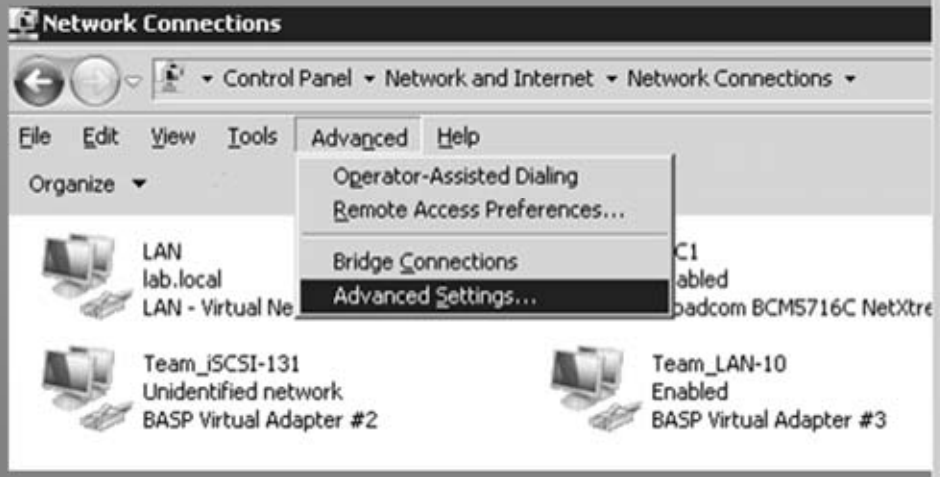
Software di teaming

- Intel Advantage Network Services
- Broadcom Advanced Server Program



Binding varie sulle NIC

- CVS richiede NTLM (o kerberos dalla prossima versione)
- iSCSI è consigliabile che sia semplice IP
- Definire l'ordine di binding in questo modo
  - Rete dedicata alla gestione
  - Rete iSCSI (?)
  - Rete dedicata alla Live Migration
  - Rete dedicata agli Heartbeat del cluster e alle comunicazioni CSV
  - Rete pubblica



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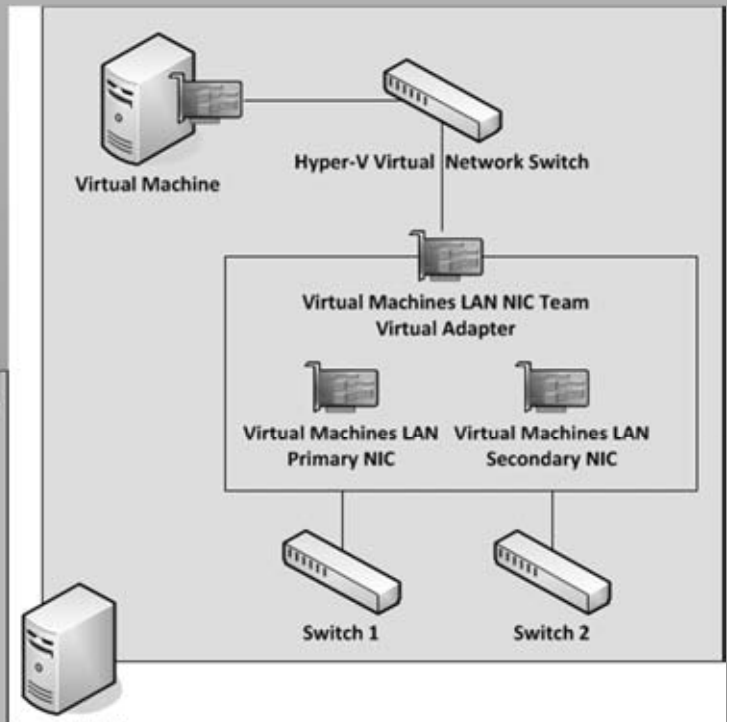
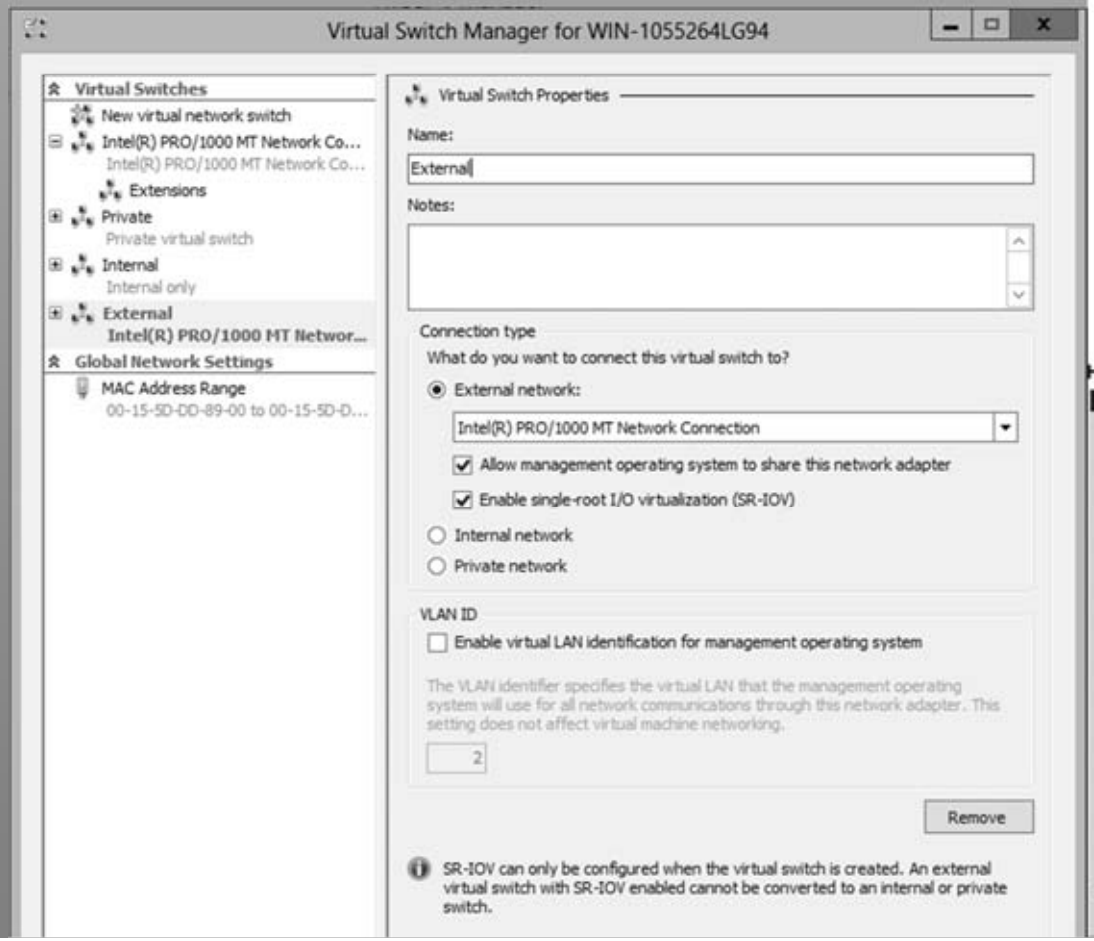
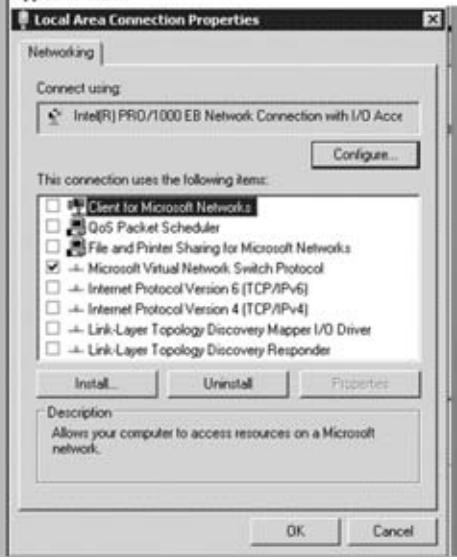
Rete virtuale

- Modalità bridge







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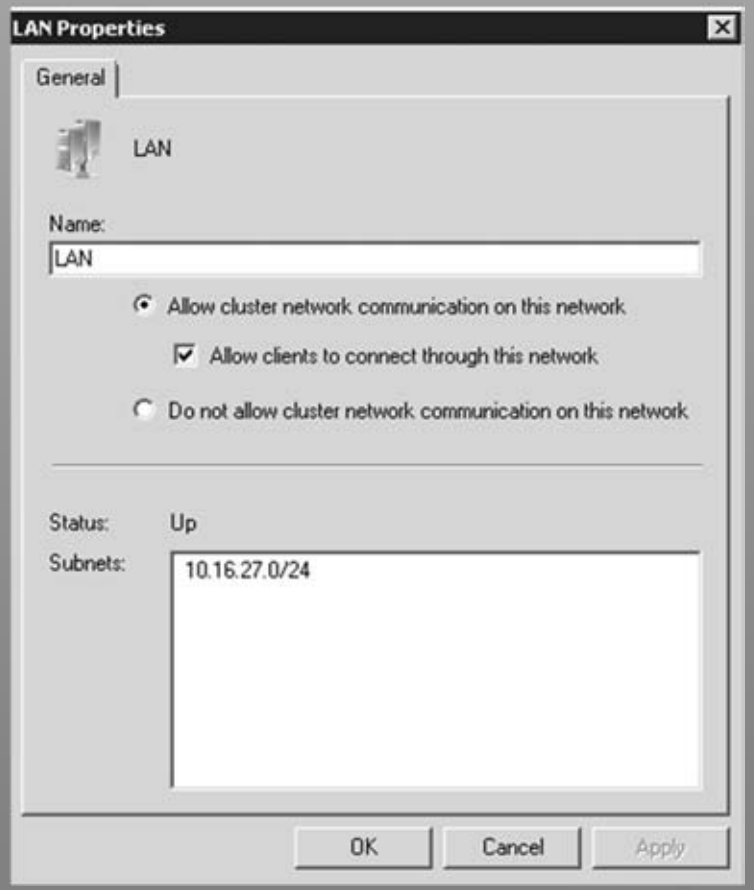
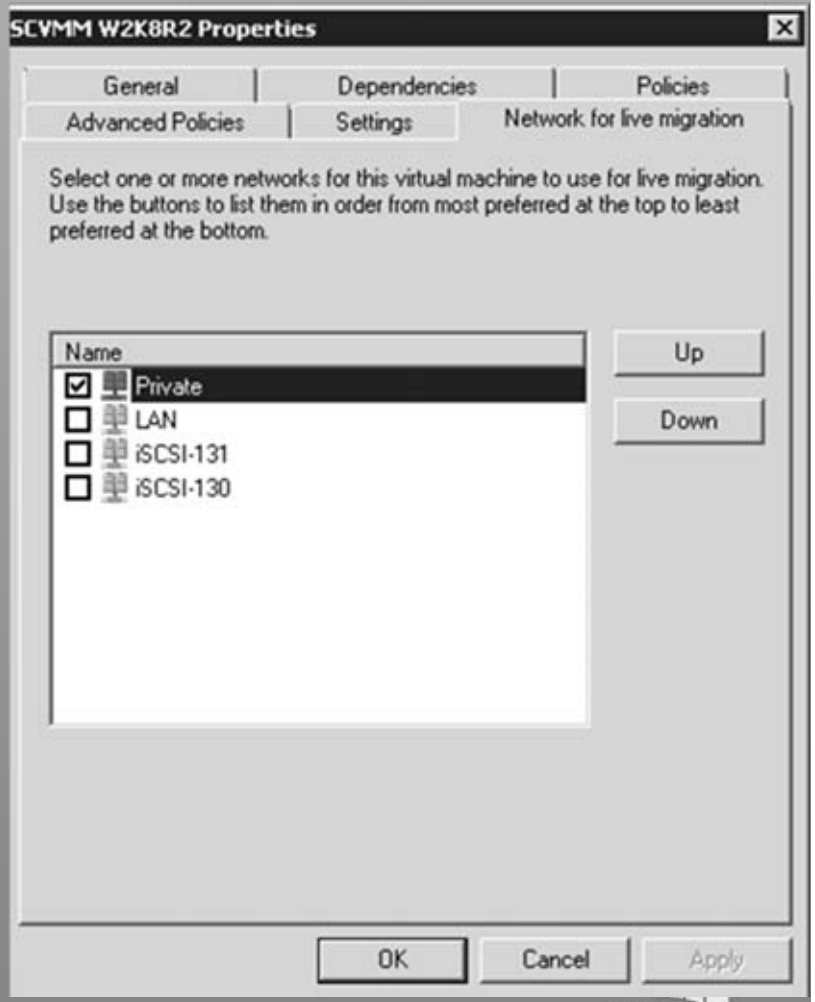
Rete per cluster heartbeat

- Configurabile nelle proprietà delle reti del Failover Cluster
- Impostare
  - Private
  - Management come backup



Rete per Live Migration

- Sicurezza
  - IPsec ha un impatto negativo sulle prestazioni
  - Usare le VLAN
- Requisito
  - Stessa rete logica
  - in Hyper-V2 solo 1 LM alla volta
- Priorità regolabile (a livello di VM)
  - Proprietà del Failover Cluster
  - When you configure a network for live migration for a specific virtual machine, the setting is global and therefore applies to all virtual machines
  - Meglio mettere almeno due scelte



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Rete per CVS

- Cluster Shared Volumes communication
- Necessaria per redirected I/O mode
- Best practice
  - **Drive letter of system disk**
    - On all nodes, the drive letter for the system disk must be the same
  - **Authentication protocol**
    - The NTLM protocol must be enabled on all nodes
    - In Hyper-V3 è possibile usare Kerberos
  - **Client for Microsoft Networks** and **File and Printer Sharing for Microsoft Networks** must be enabled

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Rete per CVS

- Scelta in automatico
  - Per verificare la rete preferenziale
    - import-module failoverclusters
    - Get-ClusterNetwork | ft Name, Metric, AutoMetric, Role
  - **Designating a Preferred Network for Cluster Shared Volumes Communication**
    - http://technet.microsoft.com/it-it/library/ff182335%28v=ws.10%29.aspx

```
PS C:\Users\Administrator.LAB> import-module failoverclusters
PS C:\Users\Administrator.LAB> Get-ClusterNetwork | ft Name, Metric, AutoMetric, Role

Name                                                Metric                    AutoMetric                          Role
----                                                ------                    ----------                          ----
iSCSI-130                                            10200                          True                             0
iSCSI-131                                            10100                          True                             0
LAN                                                  10000                          True                             3
Private                                               1000                          True                             1
```

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Demo

Virtual Networking in Hyper-V

Hyper-V3

Novità in Hyper-V3

- Nomenclatura coerente delle pNIC (W2K12)
- Supporto per il NIC teaming integrato (W2K12)
- Gestione della banda minima/massima garantita
- Support for SR-IOV (Direct Access to the physical Network adapter)
- PVLAN support
- Dynamic Virtual Machine Queue (D-VMQ)
- Receive Side Coalescing (RSC)
- DHCP Guard
- Extensible virtual switch
- IPsec Task offload

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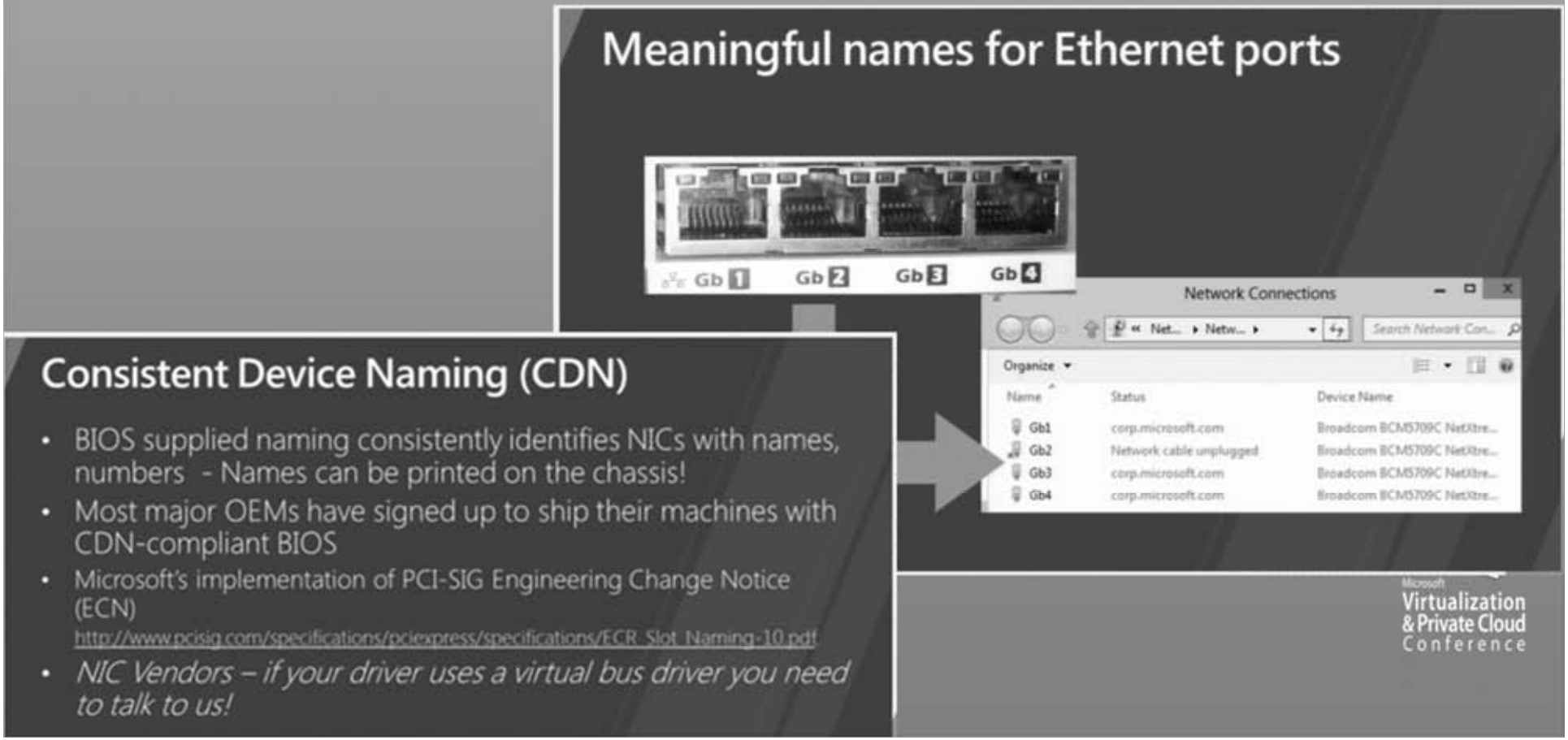
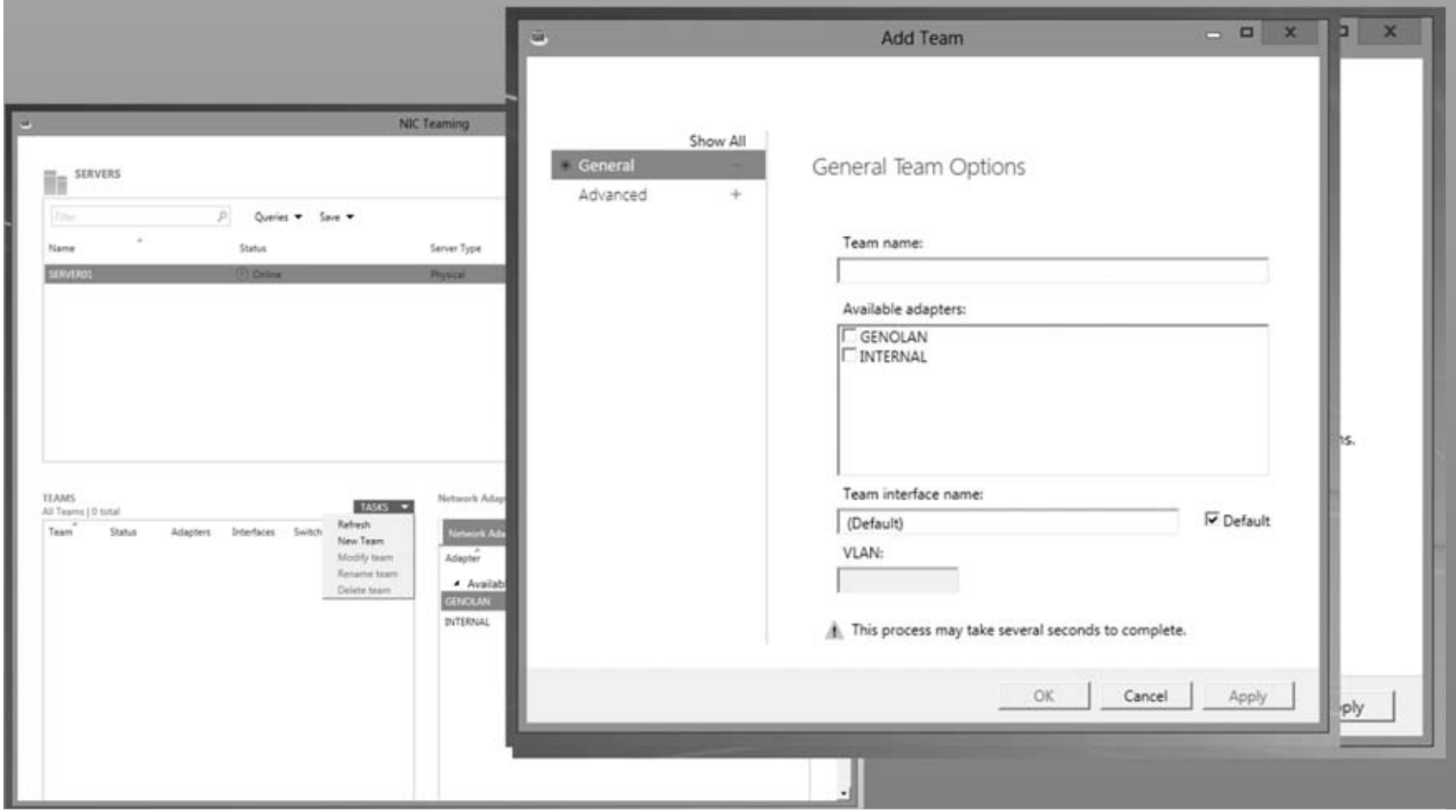
CDN (Consistent Device Naming)

- http://www.thomasmaurer.ch/2012/04/windows-server-2012-cdn-consistent-device-naming/



NIC Teaming

- http://www.thomasmaurer.ch/2011/10/windows-server-8-nic-teaming/



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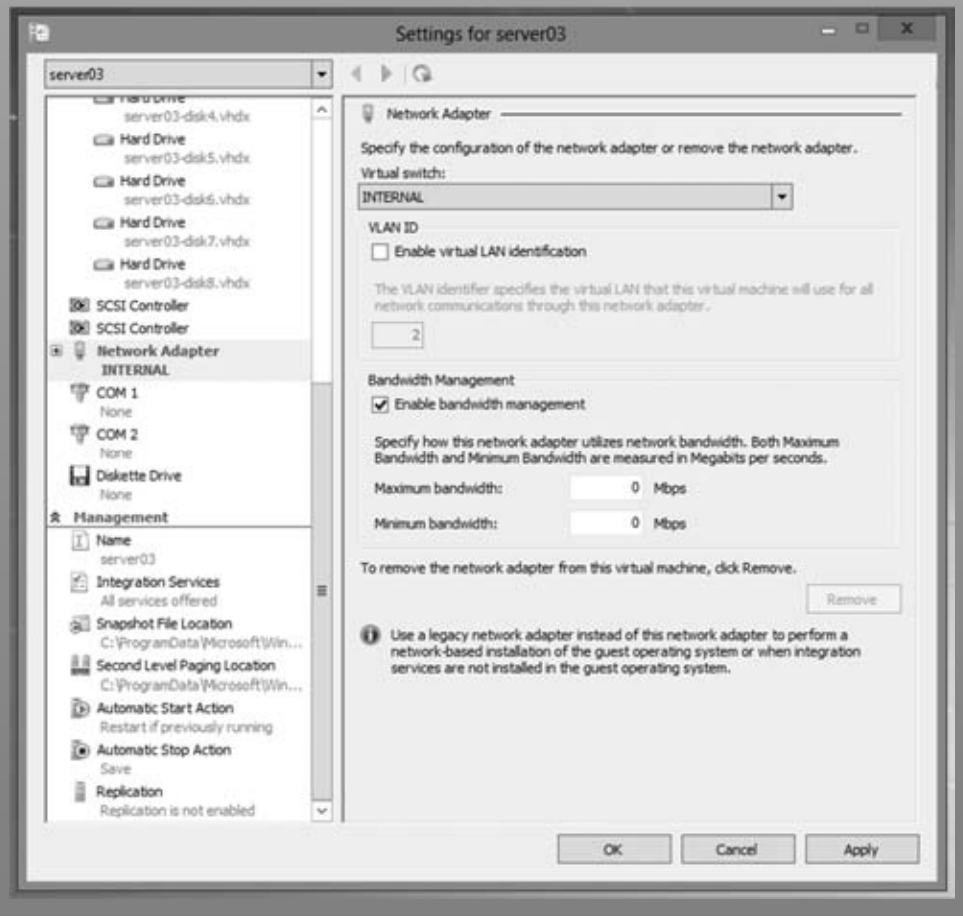
Bandwidth Management

- http://www.thomasmaurer.ch/2011/09/windows-server-8-hyper-v-network-bandwidth-management/



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SR-IOV Suppor

- http://blog.scottlowe.org/2012/03/18/sr-iov-support-in-the-next-version-of-hyper-v/
- http://blogs.technet.com/b/jhoward/archive/2012/03/16/everything-you-wanted-to-know-about-sr-iov-in-hyper-v-part-5.aspx

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Conclusioni

- Abbiamo visto
  - Pianificazione e configurazione del networking in ambiente cluster
  - Impostare i diversi tipi di traffici sulle diverse reti

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Grazie

- Modulo di feed-back
- VC08

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Questions & Answers

Grazie

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