vSphere 4.1 Performance & Security Tips

Mike Armstrong, VCP vSphere 4

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Agenda

- New features in vSphere 4.1
- Security in a virtual environment
- Secure virtual networking
- Protecting the management environment
- Protecting ESX/ESXi hosts
- Protecting virtual machines

vSphere 4.1 New Features

- Network – Network I/O Control, Load Based Teaming, IPv6, Performance
- Storage – Storage I/O Control, vStorage APIs for Array Integration (VAAI), Performance Reporting, iSCSI Offload enhancements
- Memory Compression – A New Level of Hierarchy for Overcommit
- ESXi – New Deployment Methods, Tech Support Mode Enhancements
- Performance improvements in Availability and Resource Management - High Availability (HA), Fault Tolerance (FT), vMotion, Distributed Resource Scheduler (DRS), and Distributed Power Management Enhancements
- Management – vCenter Server & Platform Enhancements

HA and DRS Cluster Improvements

Increased cluster limitations

- Cluster limits are now unified for HA and DRS clusters
- Increased limits for VMs/host and VMs/cluster

- Cluster limits for HA and DRS:
    - 32 hosts/cluster
    - 320 VMs/host (regardless of # of hosts/cluster)
    - 3000 VMs/cluster

- Note that these limits also apply to post-failover scenarios. Please be sure that these limits will not be violated even after the maximum configured number of host failovers.

Enhanced vCenter Scalability

	vSphere 4	vSphere 4.1	Ratio
VMs per host	320	320	1x
Hosts per cluster	32	32	1x
VMs per cluster	1280	3000	**3x**
Hosts per VC	300	1000	**3x**
Registered VMs per VC	4500	15000	**3x+**
Powered-On VMs per VC	3000	10000	**3x**
Concurrent VI Clients	30	120	**4x**
Hosts per DC	100	500	**5x**
VMs per DC	2500	5000	**2x**

New Active Directory Service

- Provides authentication for all local services
  - vSphere Client
  - Other access based on vSphere API
  - Tech Support Mode (local and remote)

- Has Active Directory groups functionality
  - Members of “ESX Admins” AD group have Administrative privilege
  - Administrative privilege includes:
    - Full Administrative role in vSphere Client and vSphere API clients
    - DCUI access
    - Tech Support Mode access (local and remote)

Security in a virtual environment

What makes it different from a physical environment?

- Ease and speed of server deployments
- Collapse of switches and servers into one device
- Virtual machine encapsulation into files
- Consolidation of server hardware

Security in a virtual environment

What makes it easier from a physical environment?

- Virtual switches do not learn from the network, makes them invulnerable to attacks like MAC spoofing, random frame, and other types of attacks.
- Virtual switches are also not vulnerable to spanning tree attacks because they do not need to support spanning tree protocol since they can’t be connected together and can’t create loops
- Virtual machines do not have direct access to hardware, not susceptible to buffer overflow type attacks
- Virtual machines are by design isolated from one another
- Restoring a compromised virtual machine is faster since you can quickly revert to a previous state of the virtual machine, use templates or restore from a full VM backup
- Availability of virtual security appliances
- API’s and products specifically designed to secure a virtual environment, vShield

Secure virtual networking

Physical network configurations

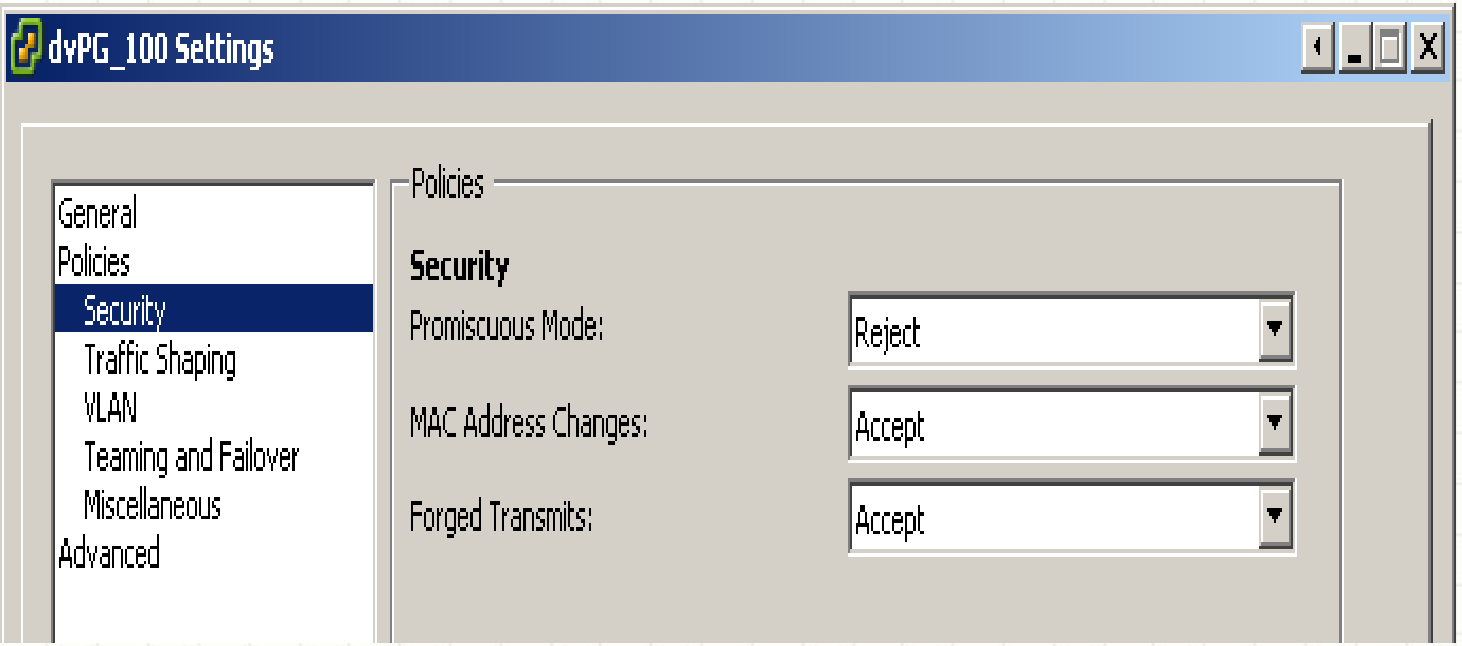
- Create separate VLANs for all management traffic, vMotion, IP Storage, and host management
- Limit VLAN's allowed on the trunk ports to host servers
- Configure physical ports connected to host servers using VMware best practices, no STP, Auto Negotiate, PortFast enabled ,multiple ports for teaming and failover

Virtual network configurations

- Change virtual switch and port group default settings for MAC address changes and Forged Transmits to Reject
- Change the default number of ports on a virtual switch
- Implement Private VLAN's to further isolate virtual machines, (need to be supported and configured on the physical switches as well)

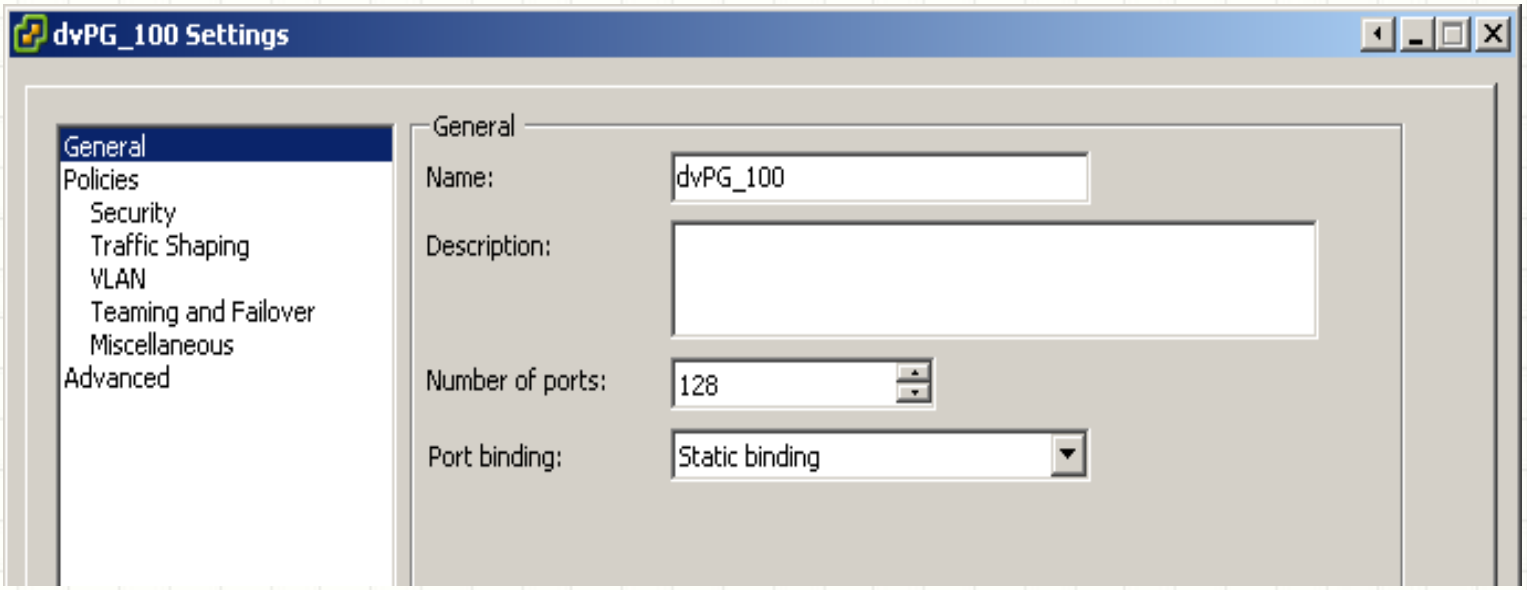
Secure virtual networking contd.

Changing default settings for MAC address changes and Forged Transmits



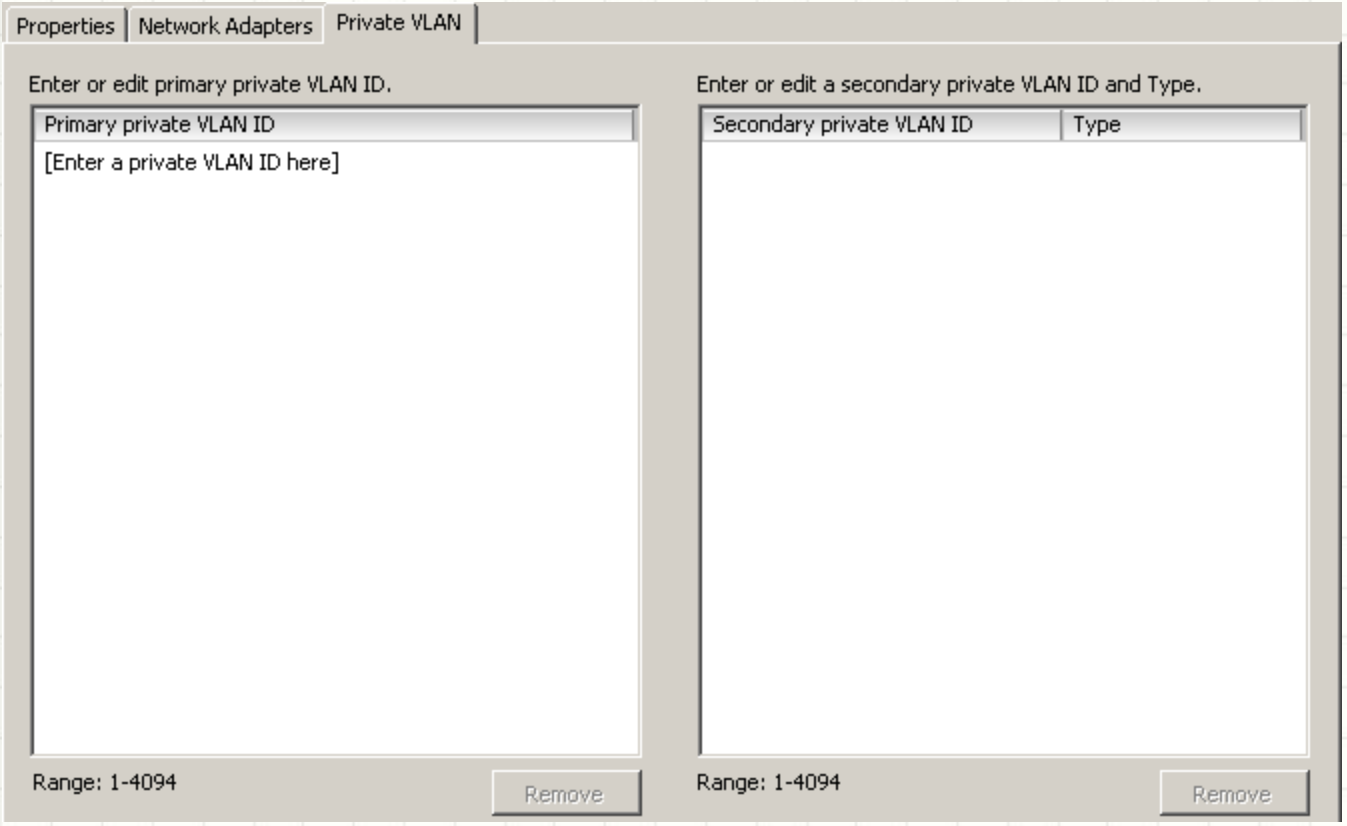
Secure virtual networking contd.

Changing the default number of ports on a virtual switch



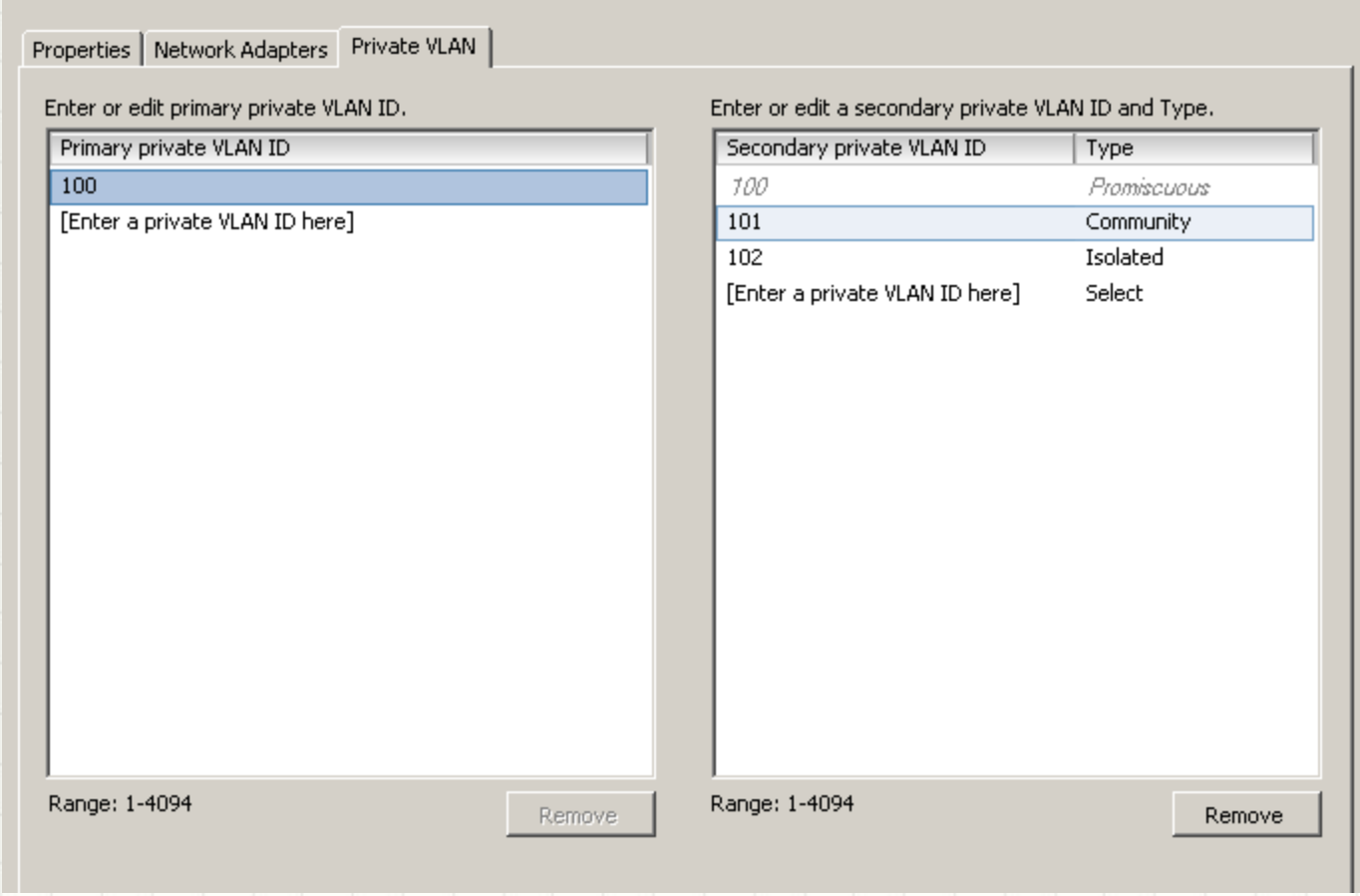
Secure virtual networking contd.

Private VLAN on Virtual Distributed Switch settings



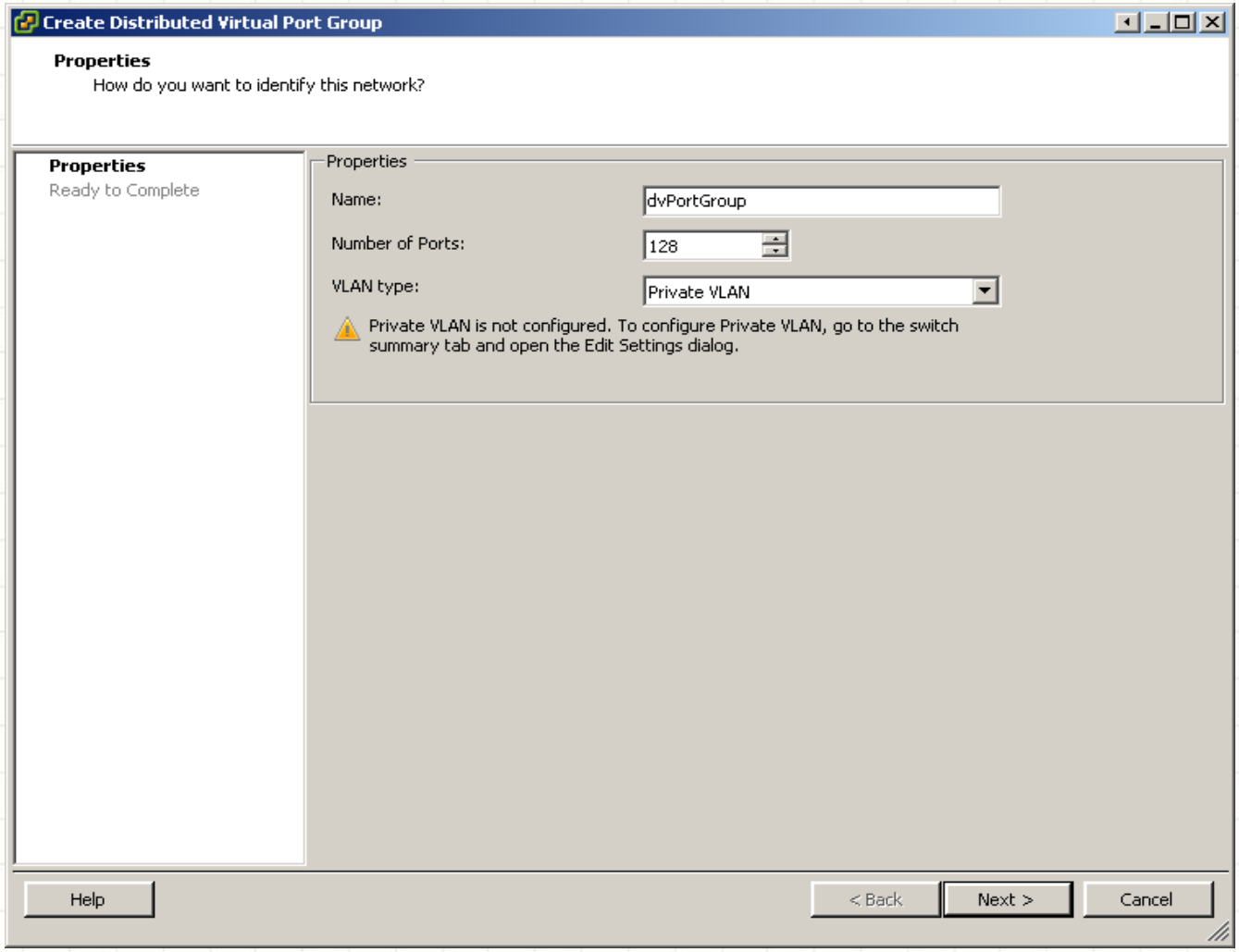
Secure virtual networking contd.

Private VLAN configuration on Virtual Distributed Switch settings



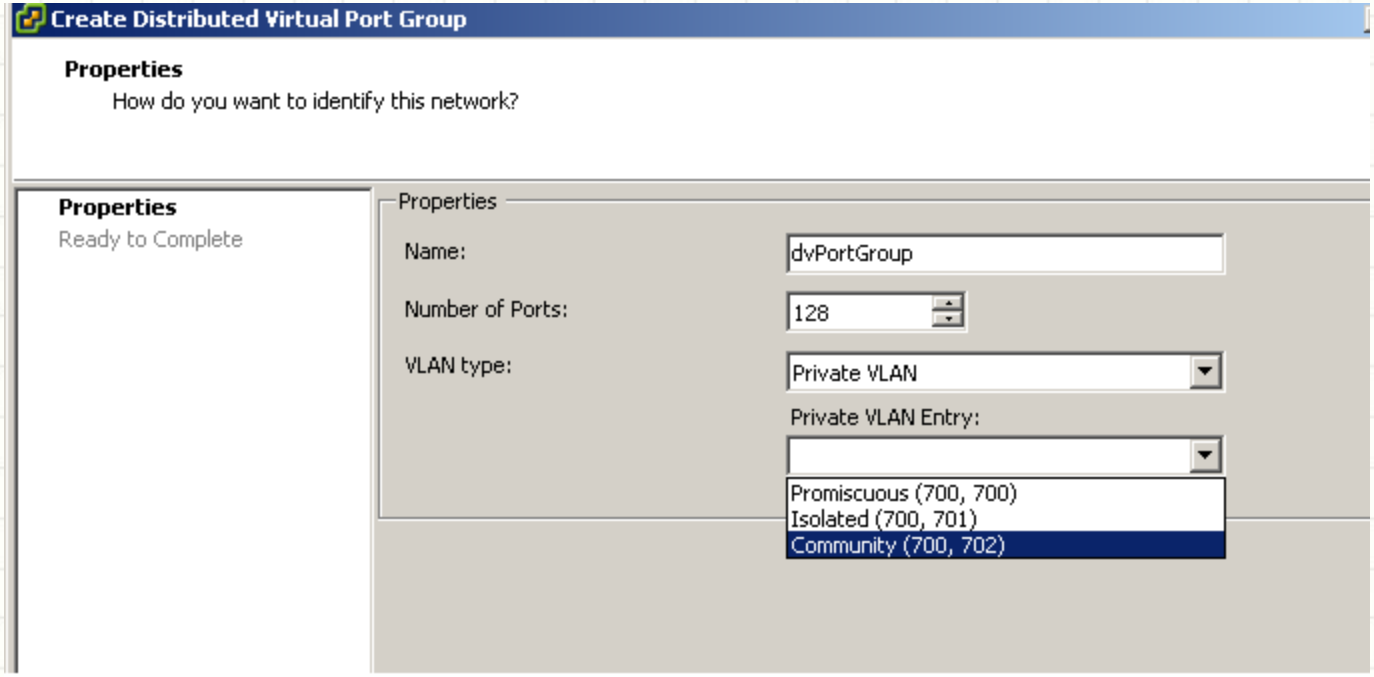
Secure virtual networking contd.

Create Private VLAN on Virtual Distributed Switch



Secure virtual networking contd.

Create Private VLAN selection on Virtual Distributed Switch



Protecting the management environment

User Access Controls

- Use vCenter server to centralize access rather than creating users or groups on individual hosts
- Add vCenter, ESX/EXSi hosts to Active Directory, create security groups for specific management and user purposes
- Use vCenter roles to assign granular permissions to groups, clone roles to create custom roles and permissions
- Apply the principle of least privilege when assigning and creating roles
- Create folders to assign roles to objects that require similar access

Gather vCenter roles and assignments using PowerCLI

- Get-vipermission –entity (get-inventory) | export-csv “c:\permissions.csv”

Protecting the management environment contd.

Install vSphere Management Assistant (vMA)

- Virtual machine that is prepackaged with vSphere cli to provide an authenticated platform to run commands and scripts
- vMA can be configured as a centralized logging system

Use the VMware PowerCLI for bulk administration and reporting

- A Windows PowerShell snapin with over 300 cmdlets

Create a Dedicated Management Cluster

- Set permissions at the Cluster level for only VM Admins

Protecting the management environment contd.

vCenter Server Hardening

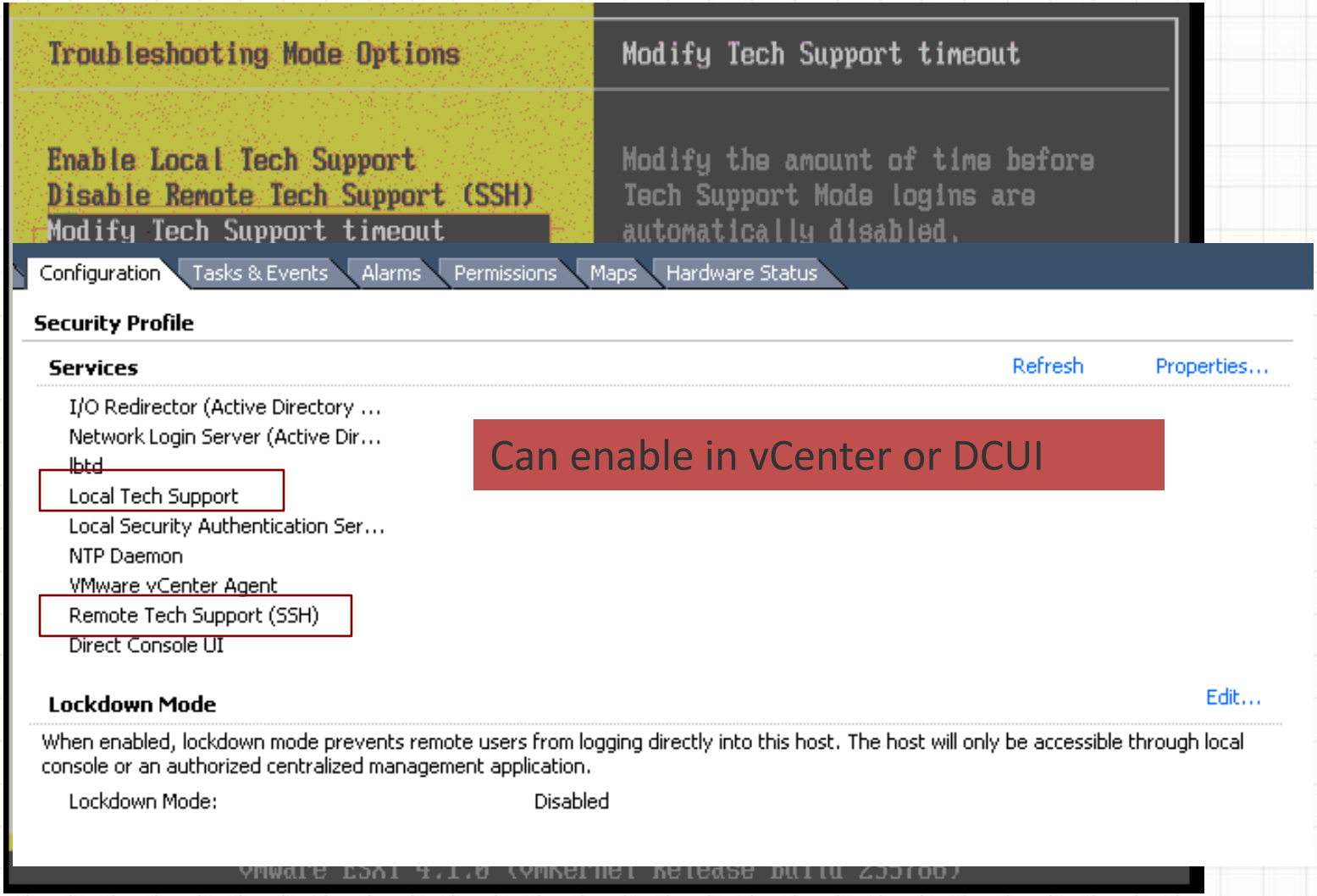
- Replace self–signed SSL certificates on vCenter and ESX/ESXi hosts with a commercial SSL cert or local CA certificate
- Keep server properly patched, Windows Updates
- Use the Windows firewall or a 3rd party firewall
- Restrict login to the system to vSphere Admins
- Install vCenter using a service account, or remove the local Administrator account after installation
- Add vCenter server to a dedicated management network
- Disable vCenter Web Access
- Deploy the vSphere client using VMware ThinApp

Protecting ESXi/ESX hosts

ESXi hosts

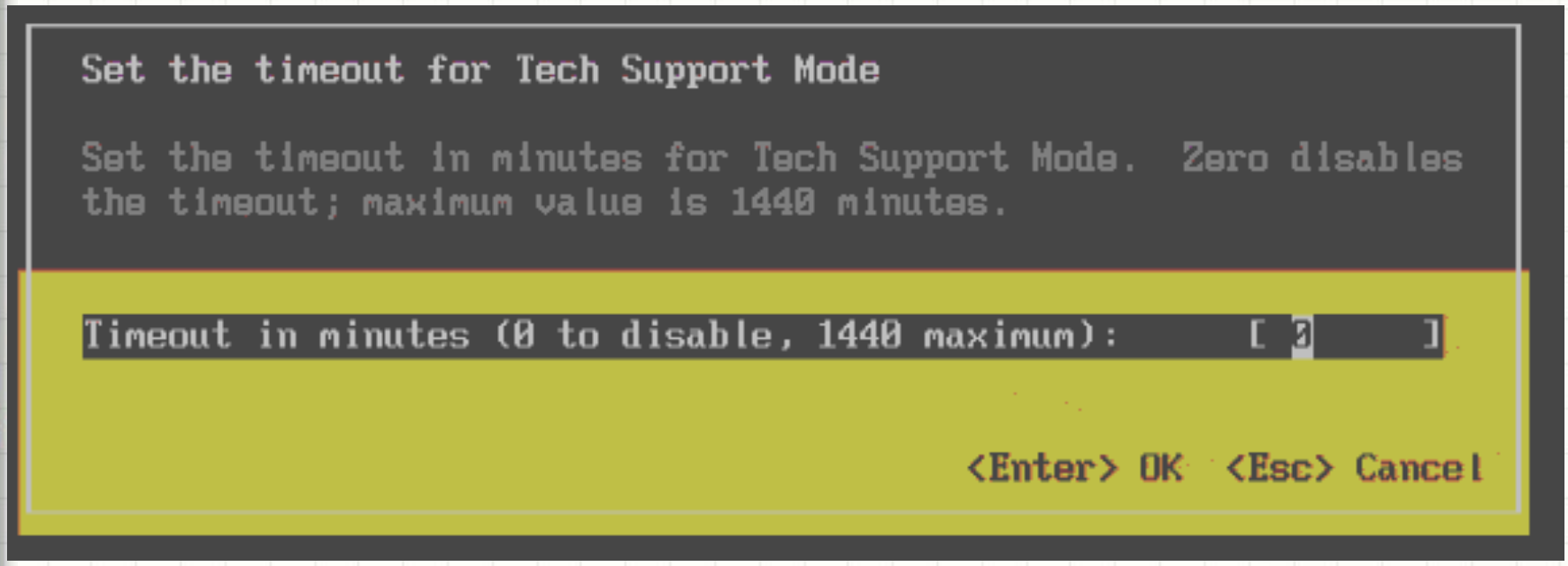
- Enable Tech Support Mode(Local and Remote) only when necessary
- Enable lockdown mode with the DCUI service turned on
- Enable lockdown mode and turn off the DCUI service (total lockdown)
- Disable the managed object browser
- Create a separate service account for Common Information Model (CIM) applications
- Remove the web welcome screen, see http://communities.vmware.com/docs/DOC-11864
- Use host profiles to reduce misconfigurations and check compliance (also for ESX hosts)

ESXi Tech Support Mode



Can enable in vCenter or DCUI

ESXi Tech Support Mode Timeout

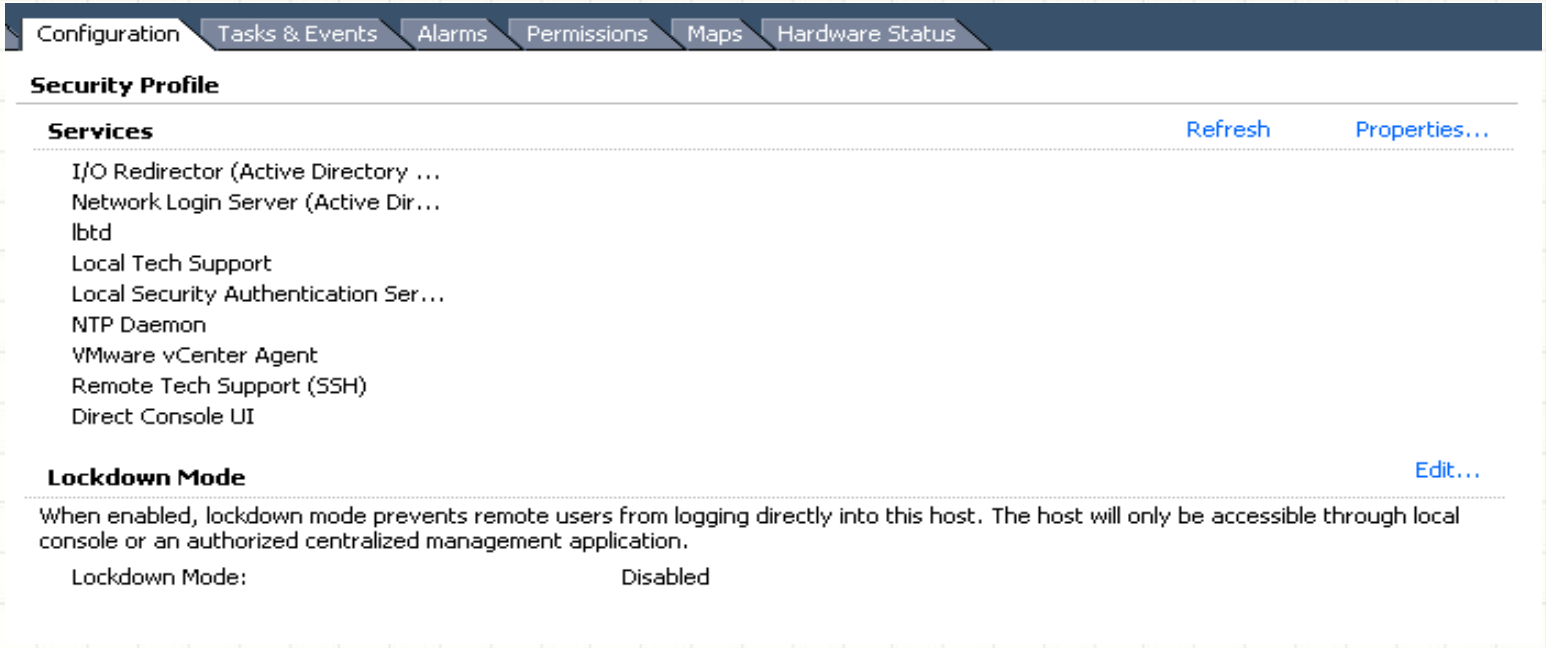


- Timeout automatically disables Tech Support Mode (local and remote)
- Running sessions are not terminated
- All commands issued in Tech Support Mode are sent to syslog

ESXi Lockdown Mode

Forces all operations to be performed through vCenter Server

- Lockdown Mode (disallows all access except root on DCUI)
- Tech Support Mode (local and remote)
- If all configured, then **no local activity is possible** (except reinstall)



Protecting ESXi/ESX hosts contd.

ESX hosts

- Upgrade to ESXi, ESX 4.1 will be the last supported version of ESX!
- Configure firewall rules based on security needs and requirements, allow only default ports (902,4 43, 80, 22)
- Modify password policies on the host for history, aging and complexity. Can modify the pam_cracklib.so plugin to modify password policies, see KB 1012033 for info
- Limit access to su commands to users in the wheel group, edit /etc/pam.d/su and remove # from line auth required /lib/security/$ISA/pam_wheel.so use_uid
- Restrict access to commands with SUDO utility
- Disallow root account login at the console, create a nonprivileged user then run cat /dev/null > /etc/securetty to modify
- Disable vSphere web access service, see KB1007617

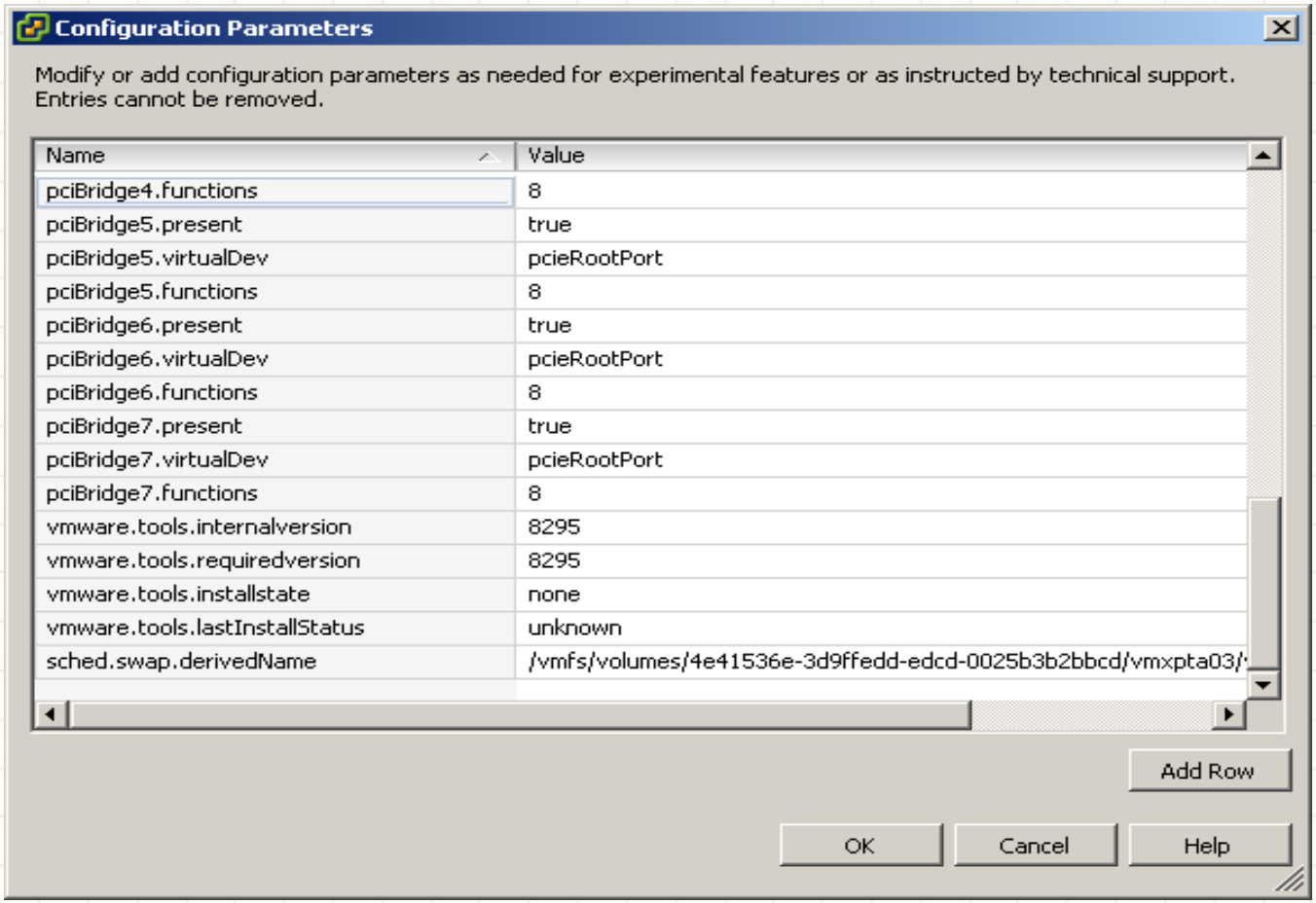
Protecting Virtual Machines

Secure the virtual machine operating system

- Enable antivirus, antispyware, firewall and IDS appliances, consider using vShield for antivirus, firewall and IDS appliances
- Keep current on updates and patches, including templates and powered off VM's
- Disable unused services and applications in the operating systems
- Disconnect unused devices, CD, floppy, serial and parallel ports and USB controller
- Use shares and reservations to ensure critical virtual machines have the resources they need

Protecting Virtual Machines contd.

Set additional security parameters in the virtual machine configuration file (VMX), or in the vSphere client



Protecting Virtual Machines contd.

List of common security configuration parameters

- Prevent virtual disk shrink:
  “isolation.tools.diskWiper.disable = True”
- Prevent connection of devices:
  “isolation.deviceconnectable.disable = True” and
  “isolation.device.edit.disable = True”
- Limit the number of console connections:
  “RemoteDisplay.maxConnections = Value 1”
- Limit virtual machine log file size and number:
  “log.rotatesize = Value 1000” and “log.keepOld = Value 10”
- Limit messages from the VM to the VMX file:
  “tools.setInfo.sizeLimit = 104856”
- Disable remote operations within the guest(VIX API):
  “guest.command.enable = False”
- Disable sending host performance information to the guest:
  “tools.guestlib.enable HostInfo = False”

Resources

- vSphere 4.1 Hardening Guide
  http://www.vmware.com/files/pdf/techpaper/VMW-TWP-vSPHR-SECRTY-HRDNG-USLET-101-WEB-1.pdf

- VMware Manage & Design for Security Class
  http://mylearn.vmware.com/mgrreg/courses.cfm?ui=www_edu&a=one&id_subject=19217

- List of VMsafe third-party solutions
  http://www.vmware.com/technical-resources/security/vmsafe/security_technology.html

- ThinApp and security
  http://vmjunkie.wordpress.com/2009/01/05/why-thinapp-is-revolutionary-from-a-security-perspective/

QUESTIONS?