TECHNICAL REPORT

Using Windows Active Directory for Account Authentication to PS Series Groups

ABSTRACT

This document details how administrators can control login authentication to a Dell EqualLogic™ PS Series Group using Windows domain user accounts and RADIUS clients.

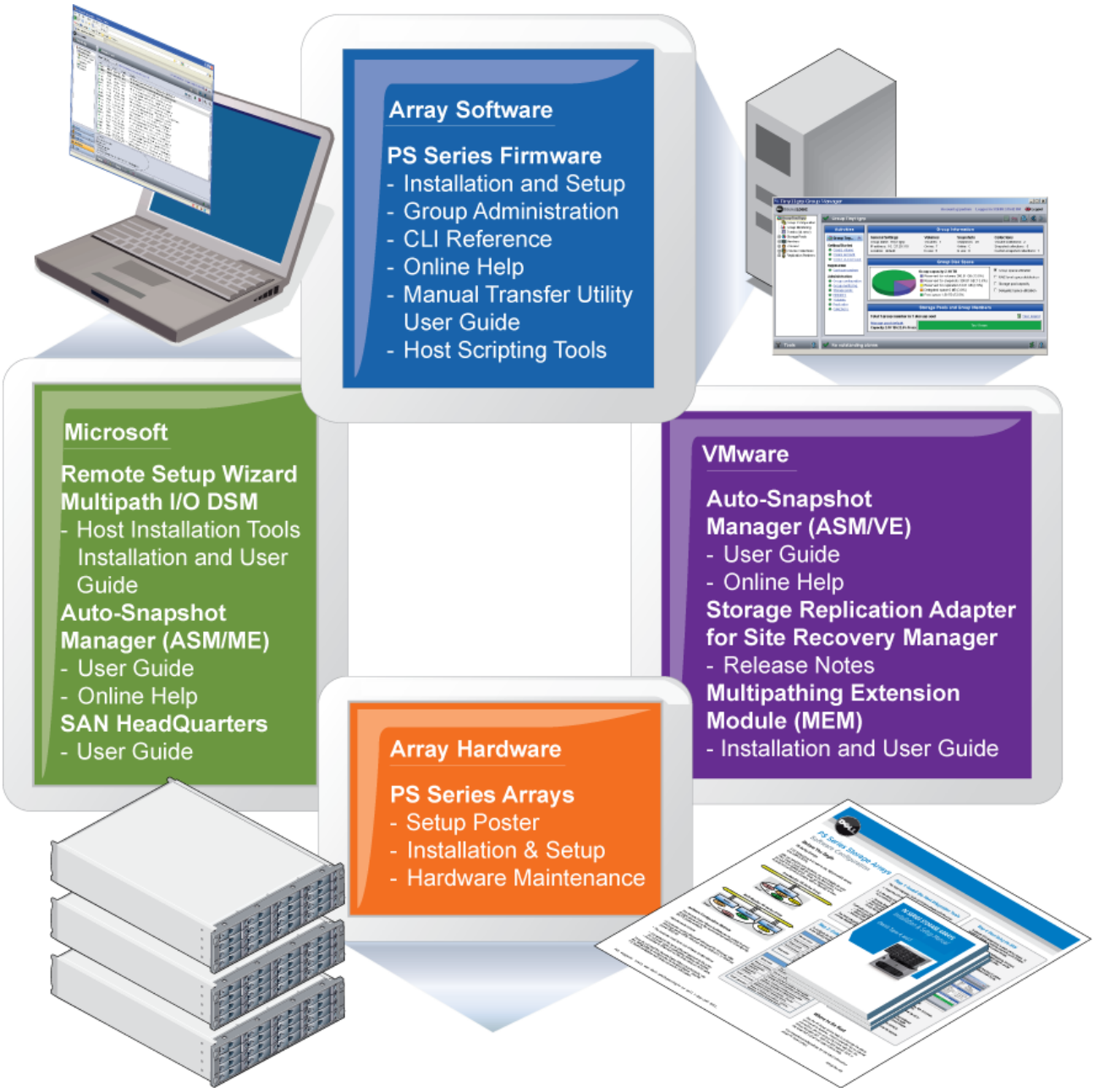
Microsoft GOLD CERTIFIED Partner

TR1035

V2.1

November 2010

WWW.DELL.COM/PSseries


Array Software
PS Series Firmware
- Installation and Setup
- Group Administration
- CLI Reference
- Online Help
- Manual Transfer Utility User Guide
- Host Scripting Tools
Microsoft
Remote Setup Wizard
Multipath I/O DSM
- Host Installation Tools Installation and User Guide
Auto-Snapshot Manager (ASM/ME)
- User Guide
- Online Help
SAN HeadQuarters
- User Guide
VMware
Auto-Snapshot Manager (ASM/VE)
- User Guide
- Online Help
Storage Replication Adapter for Site Recovery Manager
- Release Notes
Multipathing Extension Module (MEM)
- Installation and User Guide
Array Hardware
PS Series Arrays
- Setup Poster
- Installation & Setup
- Hardware Maintenance

PREFACE

Thank you for your interest in Dell EqualLogic™ PS Series storage products. We hope you will find the PS Series products intuitive and simple to configure and manage.

PS Series arrays optimize resources by automating volume and network load balancing. Additionally, PS Series arrays offer all-inclusive array management software, host software, and free firmware updates. The following value-add features and products integrate with PS Series arrays and are available at no additional cost:

Note: The highlighted text denotes the focus of this document.

- **PS Series Array Software**
    - **Firmware –** Installed on each array, this software allows you to manage your storage environment and provides capabilities such as volume snapshots, clones, and replicas to ensure data hosted on the arrays can be protected in the event of an error or disaster.
        - **Group Manager GUI:** Provides a graphical user interface for managing your array
        - **Group Manager CLI:** Provides a command line interface for managing your array.
    - **Manual Transfer Utility (MTU):** Runs on Windows and Linux host systems and **e**nables secure transfer of large amounts of data to a replication partner site when configuring disaster tolerance. You use portable media to eliminate network congestion, minimize downtime, and quick-start replication.
- **Host Software for Windows**
    - **Host Integration Tools**
        - **Remote Setup Wizard (RSW):** Initializes new PS Series arrays, configures host connections to PS Series SANs, and configures and manages multipathing.
        - **Multipath I/O Device Specific Module (MPIO DSM):** Includes a connection awareness-module that understands PS Series network load balancing and facilitates host connections to PS Series volumes.
        - **VSS and VDS Provider Services:** Allows 3rd party backup software vendors to perform off-host backups.
        - **Auto-Snapshot Manager/Microsoft Edition (ASM/ME):** Provides point-in-time SAN protection of critical application data using PS Series snapshots, clones, and replicas of supported applications such as SQL Server, Exchange Server, Hyper-V, and NTFS file shares.
    - **SAN HeadQuarters (SANHQ):** Provides centralized monitoring, historical performance trending, and event reporting for multiple PS Series groups.
- **Host Software for VMware**
    - **Storage Adapter for Site Recovery Manager (SRM):** Allows SRM to understand and recognize PS Series replication for full SRM integration.
    - **Auto-Snapshot Manager/VMware Edition (ASM/VE):** Integrates with VMware Virtual Center and PS Series snapshots to allow administrators to enable Smart Copy protection of Virtual Center folders, datastores, and virtual machines.
    - **MPIO Plug-In for VMware ESX:** Provides enhancements to existing VMware multipathing functionality.

Current Customers Please Note: You may not be running the latest versions of the tools and software listed above. If you are under valid warranty or support agreements for your PS Series array, you are entitled to obtain the latest updates and new releases as they become available.

To learn more about any of these products, contact your local sales representative or visit the Dell EqualLogic™ site at http://www.equallogic.com. To set up a Dell EqualLogic support account to download the latest available PS Series firmware and software kits visit: https://www.equallogic.com/secure/login.aspx?ReturnUrl=%2fsupport%2fDefault.aspx

TABLE OF CONTENTS

REVISION INFORMATION

The following table describes the release history of this Technical Report.

Report	Date	Document Revision
1.0	January 2008	Initial Release
2.0	May 2010	Added steps for Windows 2008 NPS and PS Series array firmware enhancements in version 5.0.0
2.1	October 2010	Added steps for CHAP authentication through RADIUS

The following table shows the software and firmware used for the preparation of this Technical Report.

Vendor	Model	Software Revision
Dell®	EqualLogic PS Series Array Firmware	V5.x
Dell®	EqualLogic Host Integration Tools for Windows	V3.4
Microsoft®	Windows Server 2008	2008, 2008 SP2, 2008 R2

The following table lists the documents referred to in this Technical Report. All PS Series Technical Reports are available on the Customer Support site at: *support.dell.com*

Vendor	Document Title
Dell®	EqualLogic PS Series Group Administration Users Guide

INTRODUCTION

Enterprises of all sizes consolidate user management and authentication into services such as Active Directory. It is common in these environments to want to control administrator accounts in the PS Series SAN from Active Directory. PS Series arrays allow the authentication of administrator (and iSCSI) accounts with AD, by using Windows Server 2003 Internet Authentication Service (IAS) or Windows Server 2008 Network Policy Service (NPS) as a connector between the PS Series SAN and Active Directory.

This paper describes the setup and configuration of RADIUS clients to authenticate to PS Series groups. Using RADIUS allows Active Directory and the PS Series group to administer accounts for SAN management. This configuration can improve security and centralize administrator privileges throughout the PS Series SAN.

This Technical Report describes the steps to configure NPS on Windows Server 2008 (and IAS on Windows 2003 – Appendix A) by creating Network Policies that grant full, partial, and read-only administrative privilege to the PS Series group.

Prerequisites

In order to setup and configure remote authentication to a PS Series group using RADUIS clients the following are required:

- A domain controller with network access to the PS Series group.
- Familiarity with Active Directory user and group account management.
- Understanding of PS Series group management.

Steps Covered in This Document

1. Prepare the server and PS Group for RADIUS authentication
    - Install and configure NPS on Windows Server 2008.
    - Configure the PS Series group as a RADIUS client.
    - Configure the PS Series group to recognize and accept login attempts from the RADIUS server.
2. Choose and configure access authentication to the EqualLogic SAN
    - Optionally Use Vendor Specific Attributes to control access to the PS Series Group
        - Create a new group in Active Directory and add select users to that group. The members of this group are those users who will administer the PS Series group and to whom the Network Policy will be applied.
        - Create a Network Policy on the NPS server that specifies conditions to grant administrator privilege to a PS Series group.
        - Add Vendor Specific Attributes to the policy to grant specific access privileges to the PS Series Group.
    - Optionally configure to use CHAP and RADIUS clients for iSCSI access to the PS Series Group

The following sections describe each of these tasks in detail.

PREPARE THE SERVER AND PS GROUP FOR RADIUS AUTHENTICATION

This section covers installing Network Policy Services, configuring the PS Series group as a RADIUS client on the NPS server and configuring the PS Series group to recognize and accept login attempts from the RADIUS server.

Installing and Configuring Network Policy Services

This procedure assumes you will install and configure these services on the same server hosting Active Directory. We recommend running these services on the same server hosting the Active Directory. If you cannot or choose not to, you must make sure that both servers are members of the same Windows Server domain, or that the service can proxy to another server with domain access to Active Directory.

Perform the following steps to install and configure the NPS on **Windows Server 2008**:

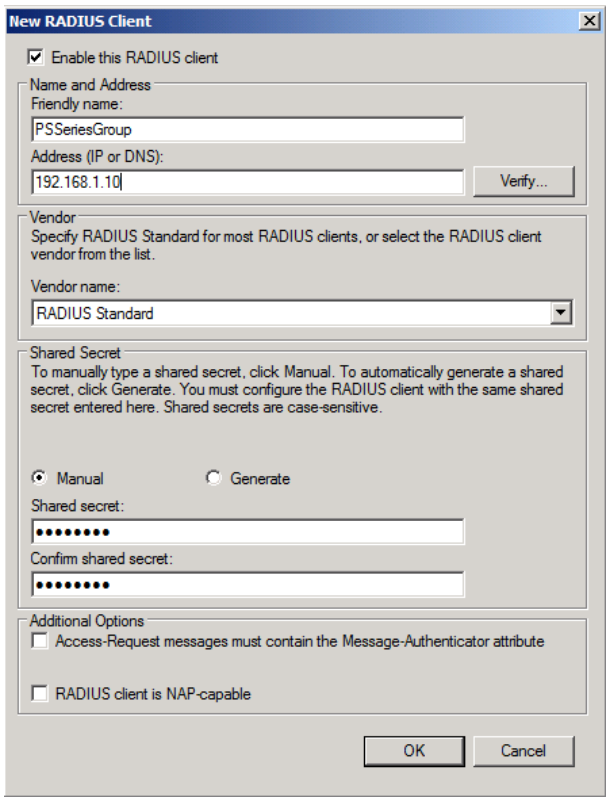
- Open **Server Manager** and add a new role.
- Select **Network Policy and Access Services** to install.
- After installing the NPS role open **Start > Administrative Tools > Network Policy Server**
- Register the NPS server in Active Directory by right clicking **NPS (Local) > Register server in Active Directory.** This setting allows the NPS Server to authenticate users in the Active Directory domain.
- Choose **OK** to the dialogue boxes to authorize the computer to read users' dial-in properties from the domain.

Configuring a PS Series Group as a RADIUS Client on the NPS Server

To set up the PS Series group as a RADIUS client on NPS (in Windows Server 2003 and IAS this will be a two-step process):

- Open the **Network Policy Server** console and right-click **RADIUS Clients**.
- Click **New RADIUS Client** to open the New RADIUS Client wizard, Figure 1.

Figure 1: New RADIUS Client



Enter the following information:

- In the **Friendly name** field, enter a name for the client. We suggest using the PS Series group name.
- In the **Client address** field, enter the PS Series group IP address. (Verifying the address is optional.)In the **Vendor name** drop-down list, select **RADIUS Standard**, if not already selected.
- Check the **Manual** option if not checked already and enter and confirm a **Shared secret** (password). Remember or make a note of the secret, as you will need to specify the same secret (password) in a later step on the PS Series group.
- Select or deselect the checkbox next to **Request must contain the Message Authenticator attribute**, as you prefer. PS Series arrays support this attribute, but whether you require it depends on your security policies.
- Click **Finish**.

Configuring the PS Series Group for RADIUS Login Attempts

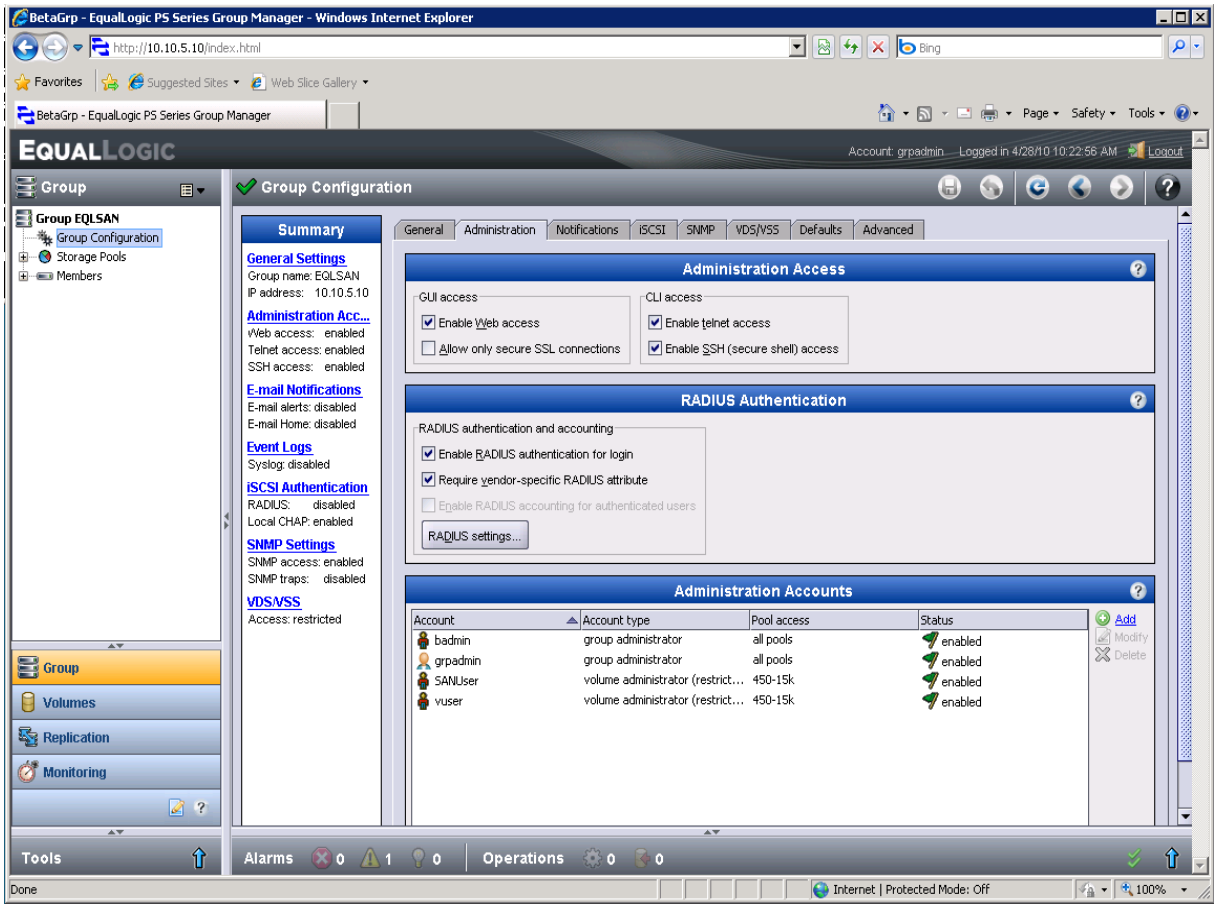
The PS Series group must be configured to accept login attempts from the RADIUS server. This will allow your administrators to connect to the PS Series SAN (or SANs). You can use either the Group Manager GUI or the CLI to configure the group. See Appendix B for instruction on using the command line interface.

Using the Group Manager GUI

To configure the group using the Group Manager GUI:

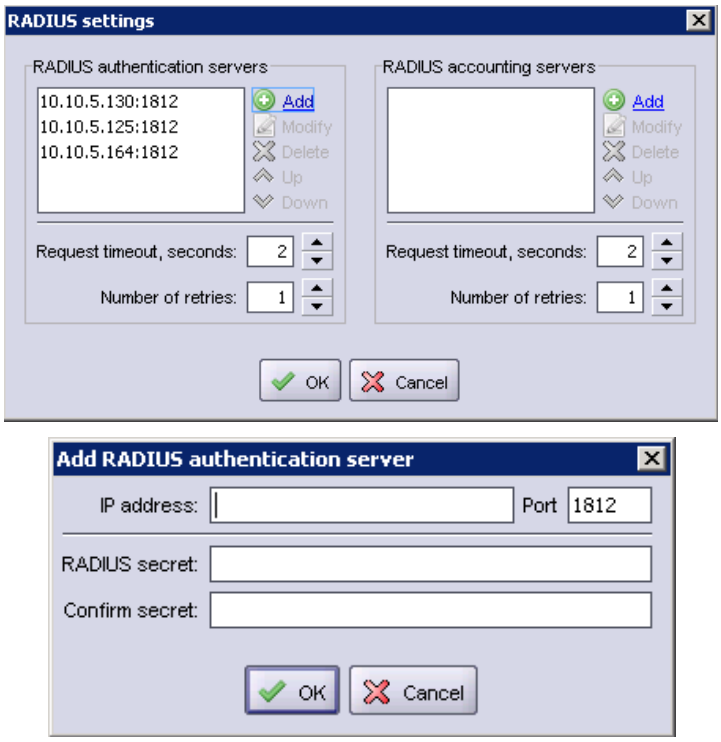
- Log in to the Group Manager GUI.
- Click **Group Configuration** > **Administration** tab (Figure 2).

Figure 2: PS Series Group Manager – Administration



- In the RADIUS Authentication panel, select the checkbox: **Enable RADIUS authentication for login** and **Require vendor-specific RADIUS attribute**.
- Optionally (not recommended), deselect the checkbox: Enable RADIUS accounting for authenticated users.
- Click **RADIUS Settings**, (Figure 3).
- In the RADIUS authentication servers area, click **Add**.

Figure 3: RADIUS Settings



- Enter the IP address for the RADIUS authentication server, and enter and confirm a secret. Click **OK**.
- Adjust the Request timeout value and Number of retries value in the RADIUS settings dialog window as desired. Click **OK**.

Finally, confirm and save all settings by clicking the floppy disk icon in the upper right of the group manager interface.

MANAGING SAN ADMINISTRATION THORUGH VENDOR SPECIFIC ATTRIBUTES

Depending on the role of the SAN administrator, multiple user groups can be created to use Vendor Specific Attributes to control access privileges to the PS Series SAN. For example some users may have full access to the PS Series group while others may have read-only or volume access to the group.

This section will detail the process of creating users and assigning them to specific groups to manage the PS Series SAN.

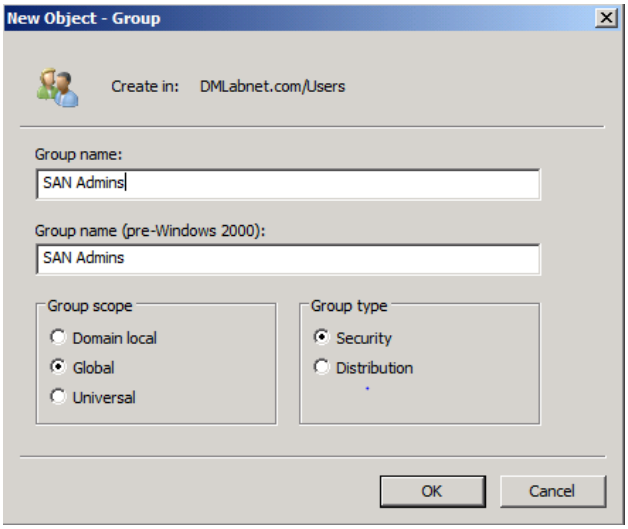
Creating Users and Groups for SAN Administration

It is recommended to create new Active Directory groups to manage the users that will have SAN privileges. This will help manage SAN administrators and prevent other users from accessing the PS Series SAN.

To add a new group to manage the PS Series group administrators and add users to that group:

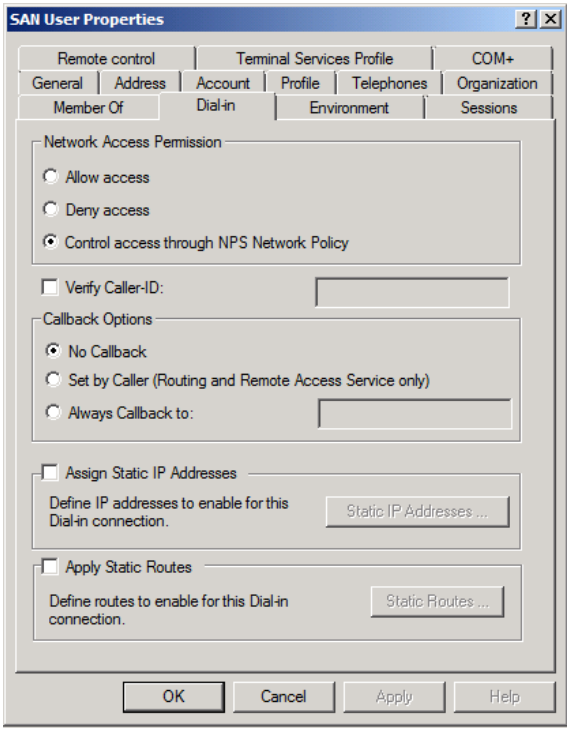
- Open the Using Active Directory Users and Computers panel and create a new group to manage SAN Administrators (Figure 4).

Figure 4: New Group



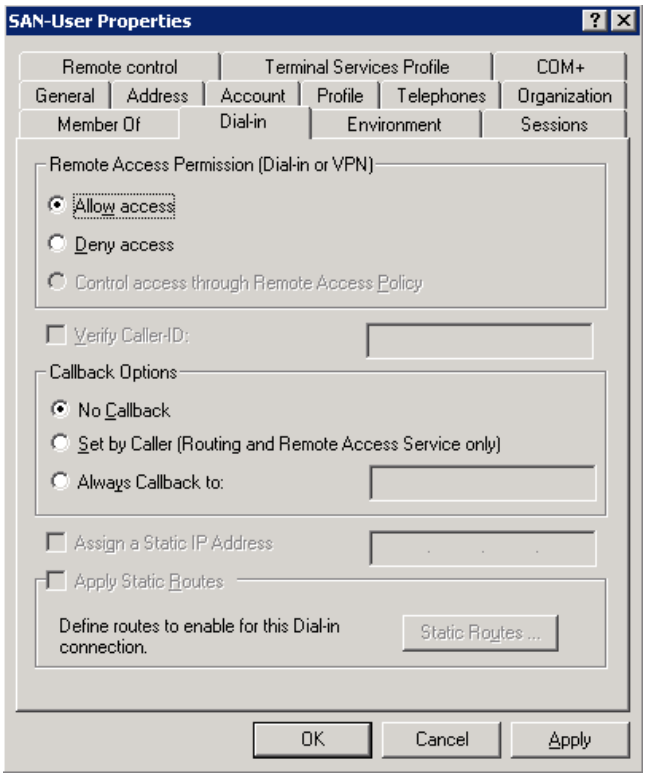
- Now you can add users to the new group that will manage the PS Series SAN. Make sure the Remote **Dial-in** properties for each user is set to **Control access through NPS Network Policy** (Figure 5).

Figure 5: Remote Dial-in Properties



Note: If you are currently running in mixed mode you will have to **allow** each user Remote Access Permission (Figure 6).

Figure 6: Adding Remote Access Permissions (Mixed mode domain)



Creating Network Policies on the NPS Server

A network policy applies to a user profile (in Active Directory) and tells the RADIUS server what type of privilege to grant a user who attempts to log in to a PS Series group. You must create a network policy for each type of account configured on the PS Series group. All PS Series Firmware versions support group administrator full access and read-only accounts.

When the user is authenticated, the policy also specifies the authentication information to return from the RADIUS server to the PS Series group. For example, it indicates whether the user is a group administrator or a pool administrator, and which pools they are allowed to manage.

Pool administrators can manage the objects in their designated pools, and optionally can have read-only permission on all other objects in the group (members, pools, and volumes). Volume administrators can manage a specific amount of storage or quota value in a designated pool. For more information on pool administrators, see the Group Administration guide.

Table 1 list some of the most common used attribute values for network policies as well as new values introduced in PS Series firmware v5.0.x. For a complete list of all supported attribute values and PS Series firmware requirements see Table 2 in Creating Additional Network Policies Using Optional VSAs.

Table 1: Common PS Series Supported Vendor Specific Attributes and Firmware Versions

Attribute	Field	Value	PS Series Supported Firmware
EQL-Admin	Attribute Number	6	Value 0 – All Versions Values 1, 2 – Version 3.2.x and higher Value 3 – Version 5.0.x
	Attribute Format (Syntax)	Decimal	
	Attribute Value	**0** = Global Admin, **1**=Pool Admin only, **2**=Pool Admin with group read access, **3**=Volume Admin	
EQL-Pool-Access	Attribute Number	7	Version 3.2 and higher *Use `unlimited` to set an unlimited quota for the pool, (example: `Pool1 unlimited`). If no unit is specified, the default capacity unit is MB.
	Attribute Format (Syntax)	String (Max. length: 247)	
	Attribute Value	Value is the pool name. The quota for volume administration accounts is expressed as *PoolName Quota*, with G and M appended to the quota representing GB and MB, respectively. For example: `Pool1 25G` sets the quota for Pool1 to 25GB and `Pool1 500M` sets a quota of 500MB.	
EQL-Replication-Site-Access	Attribute Number	8	Version 5.0 and higher
	Attribute Format (Syntax)	String (Max. length: 249)	
	Attribute Value	Indicating a comma-separated list of replication site names	
EQL-Admin-Account-Type	Attribute Number	9	Version 5.0 and higher *To create a read-only account, set the `EQL-Admin` value to `0` and the `EQL_Admin-Account-Type` to `RO`.
	Attribute Format (Syntax)	String (Max. length: 249)	
	Attribute Value	RO or RW - Indicating whether the account is read-only or read-write	

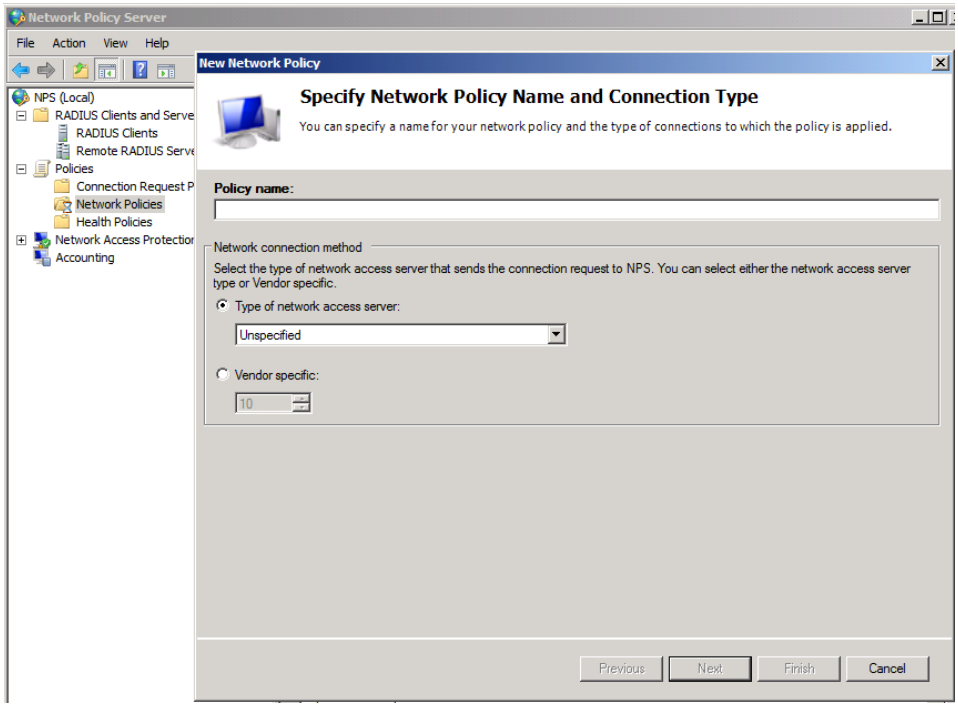
This section describes creating a Network Policy for group administrators (those with full, group-wide privileges).

To create a Network Policy for PS Series group administrators on the NPS Server:

- Click **Start** > **Administrative Tools** > **Network Policy Server**.

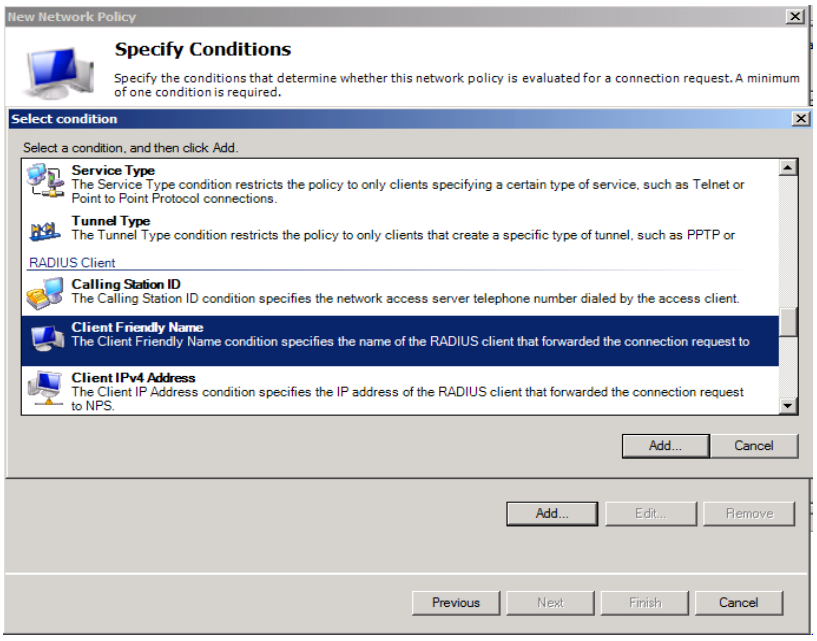
- Expand the **Policies** section, right-click **Network Policies**, and click **New.**
- The New Network Policy Wizard starts (Figure 7).
- Give the policy a name and leave the *Type of network access server* button checked with **Unspecified** in the box and click **Next**.

Figure 7: NPS – Create New Network Policy



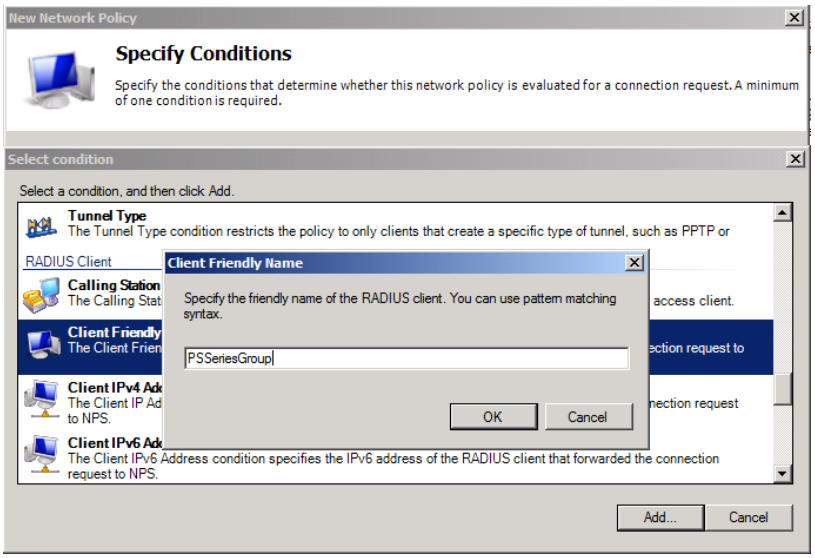
- The Specify Conditions screen starts.
- Click **Add** to add the conditions that need to be met in order to access the PS Series Group.
- In the **Select Condition** view, scroll down to **Client Friendly Name** and click **Add** (Figure 8).

Figure 8: Policy Conditions



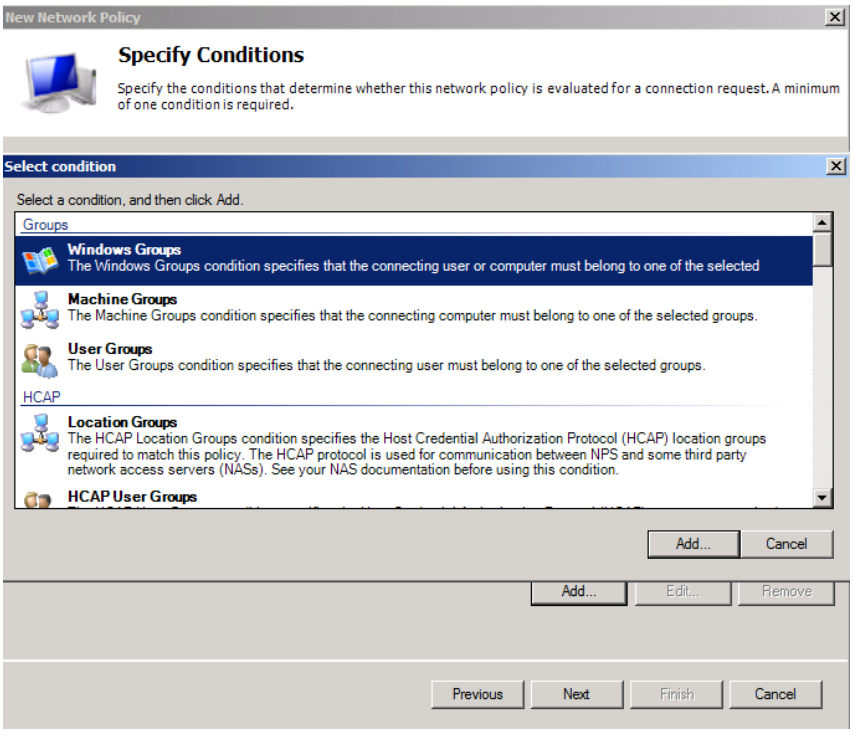
- In the **Client Friendly Name** window add the name of the RADIUS Client created for the PS Series group admins in the previous section (Figure 9).

Figure 9: Client Friendly Name



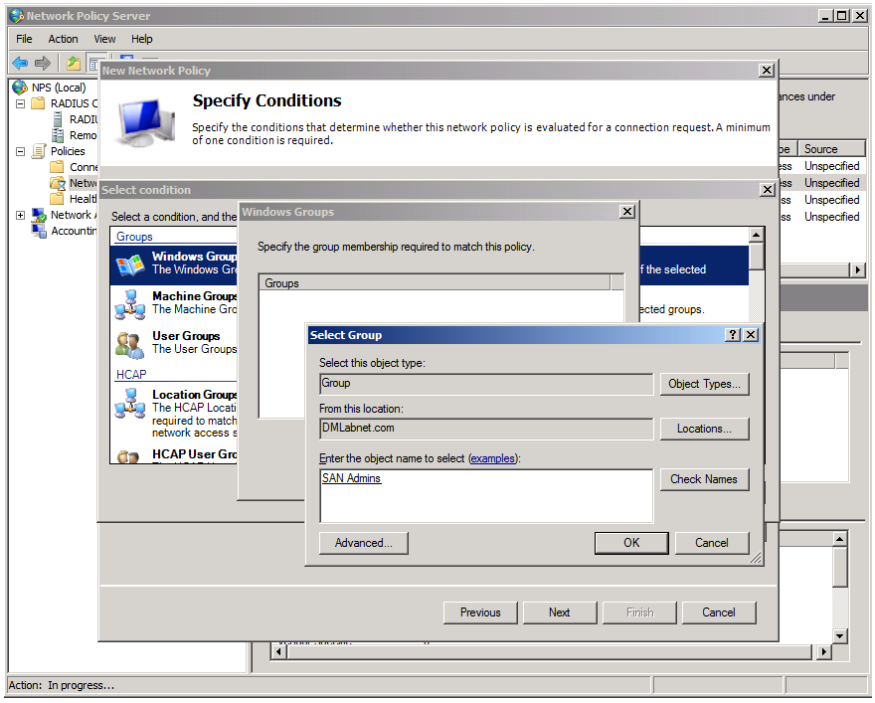
- Verify the information is correct in the Specify Conditions list and click **Add** to add the next condition. The next condition needed will be the user group account with logon permissions.
- In the **Select Condition** view, choose **Windows Groups** and click **Add** (Figure 10).

Figure 10: Adding Windows Groups



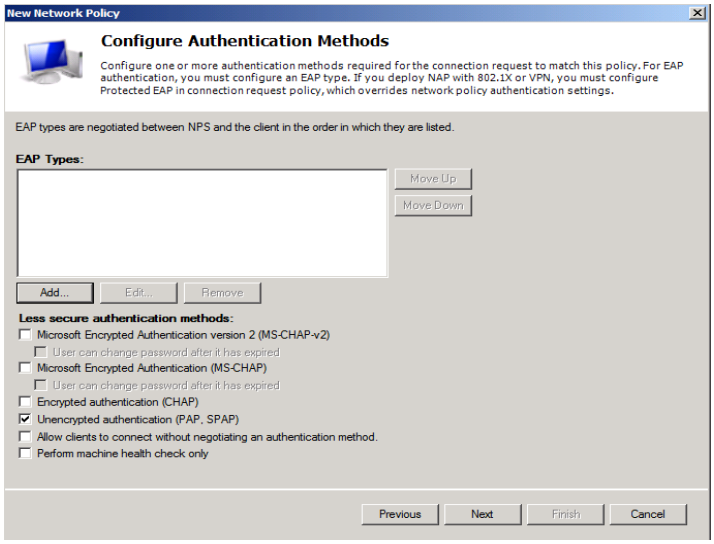
- Specify the Windows Groups by adding the "SAN Admins" group created in the previous section (Figure 11).

Figure 11: Specify Windows Groups



- Click **OK** to confirm the selection and complete the conditions entry. Verify the new network policy conditions are correct and choose **Next** to continue.
- Grant network access by checking the **Access granted** button in the **Specify Access Permission** window and click **Next**.
- In the Configure Authentication Methods window only check the **Unencrypted authentication (PAP, SPAP)** box and uncheck all others (Figure 12).

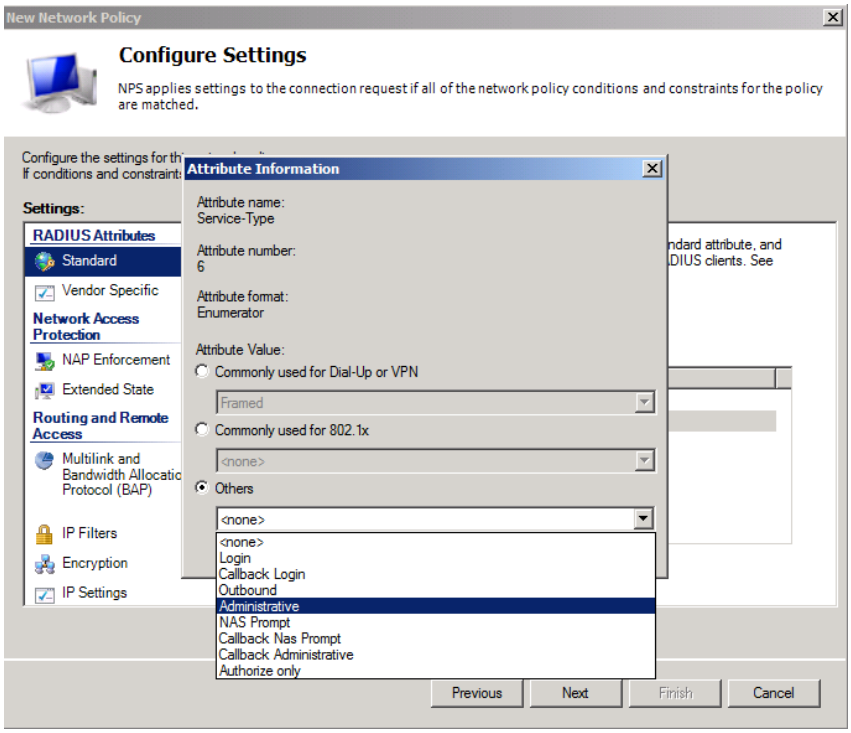
Figure 12: Configure Authentication Methods



Note: By default, all passwords are encrypted by the RADIUS protocol. Choosing the unencrypted authentication here is simply for tunneling into the NPS server.

- A Connection Request Policy pop up may appear. Choose **No** to disregard the help topic.
- Optionally configure constraints in the next window and click **Next**.
- In the **Configure Settings** window click on **Standard** in the RADIUS Attributes section.
- Remove the **Framed-Protocol** attribute and change the **Service-Type** to Administrative (Check **Others** and choose **Administrative** in the drop down box, Figure 13). Click **OK** when done.

Figure 13: Service Type Attribute



Adding the PS Series Vendor-Specific Attributes

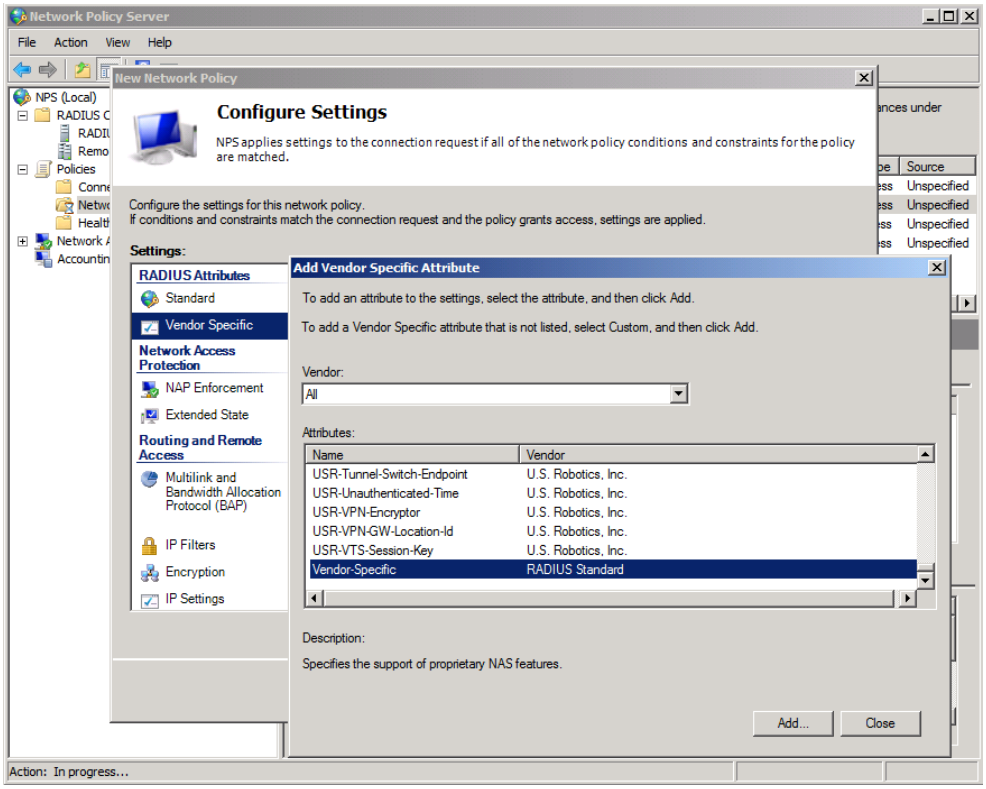
Vendor-specific attributes tailor the remote access policy to the vendor. For PS Series arrays, there are two required attributes, and several optional ones. The required attributes control what objects on the PS Series group users can manage once they log in. Group administrators can manage all objects on the group, including adding and removing members, and creating storage pools.

If you configure the optional attributes, the values will be supplied automatically to the PS Series group and will appear in the Contact Information fields (except for EQL-Admin-Poll-Interval) in the Group Manager GUI for each contact. Every time a user logs in, their information will be updated if it has changed since the last login.

The following procedure continues from Creating Network Policies on the NPS Server, and assumes the **Configure Settings** screen is still displayed.

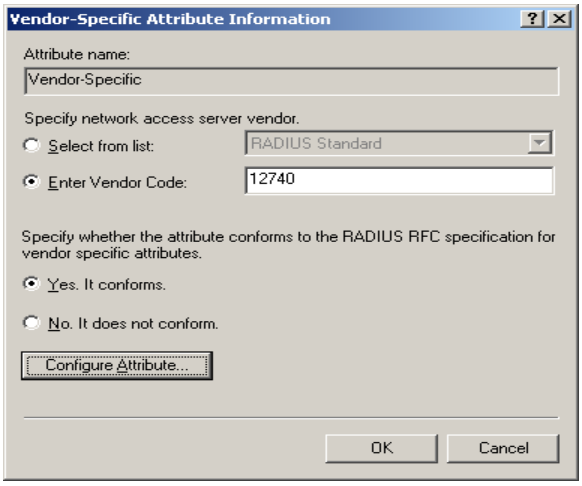
- On the same screen click **Vendor Specific** in the RADIUS Attributes area and **Add** a new Vendor Specific attribute.
- In the Add Vendor Specific Attribute window leave the Vendor at All and scroll down in the Attributes to **Vendor-Specific – RADIUS Standard** (Figure 14) and click **Add**.

Figure 14: Vendor Specific Attribute



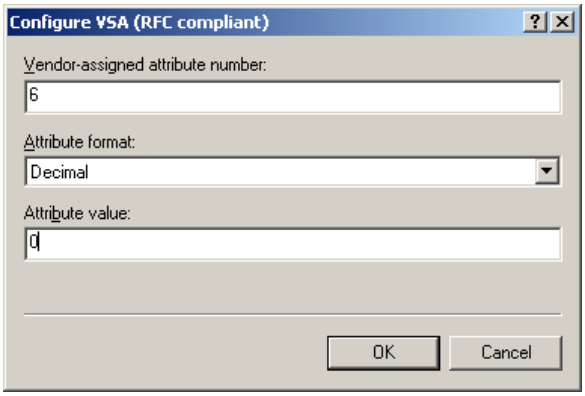
- In the Attribute Information window click Add.
- In the next wind**ow check Enter Vendor Code and en**ter **12740** in the field. **Thi**s is the vendor code for PS Series arrays. Select **Yes, It conforms** button and click **Configure Attribute** (Figure15).

Figure 15: Vendor-Specific Attribute Information



- The Configure VSA dialog box is displayed (Figure 16).

Figure 16: Configure VSA



- Enter the following information for the PS Series group administrator attribute:
  - In the Vendor-assigned attribute number field, enter **6**
  - In the Attribute format drop-down list, select **Decimal**.
  - In the Attribute value field, enter **0** (for a group administrator).
- When finished click OK twice and Close the Add Vendor Specific Attribute window and verify the information is correct in the Configure Settings screen.
- Refer to Table 1 for optional Vendor Specific Attributes for PS Series arrays.

- To finish the Configure Settings section click on **Encryption** at the bottom of the Settings section.
- Uncheck all the boxes except **No encryption** and click **Next**. This will allow the Network Policy to rout through to the RADIUS server.
- Complete the New Network Policy by verifying the setting and clicking Finish.

Creating Additional Network Policies using Optional VSA's

This section will discuss optional vendor specific attributes that can be used to add more granular access to a PS Series group. An example of an administration account with more granular access would be a pool administrator. Pool administrators have management privileges only for specific pools on a PS Series group. To allow those users to log in yet restrict their privileges to only the pools appropriate to them, you must create a unique Active Directory group and a Remote Access Policy on the NPS server specific to each type of pool administration account you need.

Another example might be a volume administrator. Volume administrators have access to a specific pool and a quota value that they can use for volume creation. These are some of the examples that will be discussed in this section.

Follow the steps laid out in the previous sections to add new user groups for the new administration roles and refer to Creating Network Policies on the NPS Server to add the new policy attributes for administrators.

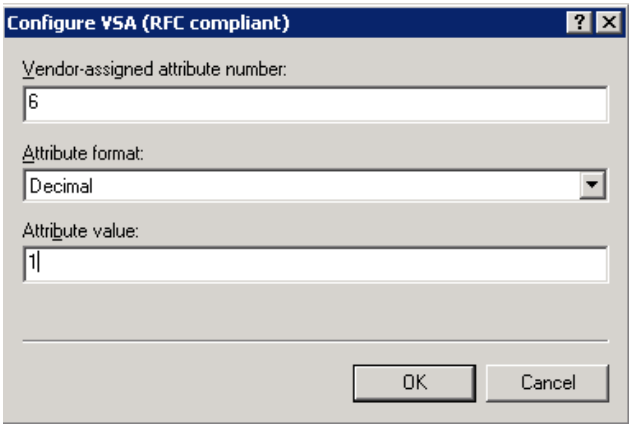
Note: Attribute values are supported at specific PS Series firmware levels. Refer to Table 2 in this section for a complete list of supported attribute values and firmware levels.

Example 1: Configuring Attributes Values for Pool Administrators:

For example, you might have pool administrators for Pools A and B on a PS Series group, and others for Pools C and D. Additionally, you might have pool administrators who also have group-wide read-only privilege. These users can see, but not change, all the other objects in the group.

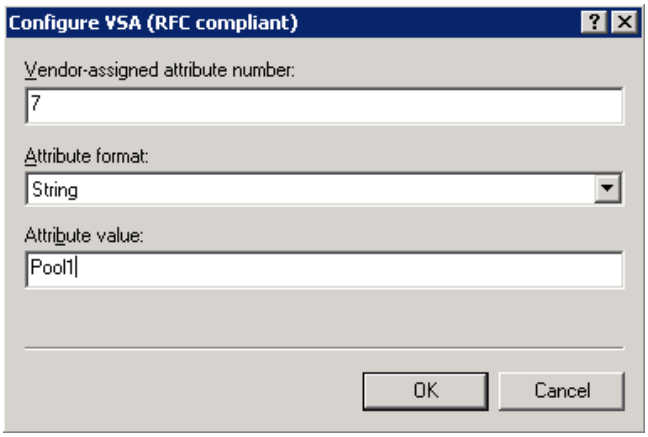
When adding the Vendor Specific Attributes for the new Network Policy, follow the steps below. Add a vendor-specific attribute with the following fields:

- Vendor-specific attribute number: enter **6**
- Attribute format drop-down: select **Decimal**
- Attribute value field: enter **1**

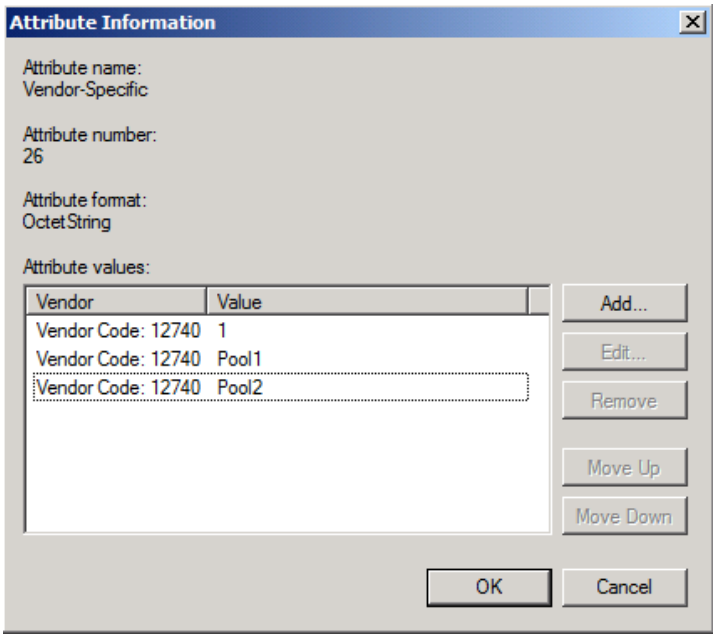


- Click **OK** twice to get back to the Attribute Information window.
- **Add** another Attribute Value to specify the PS Series pool attributes. Use the same Vendor Code for network access server (12740) and choose "**Yes. It conforms**." Configure the attribute values as follows:

- Vendor-assigned attribute number: enter **7**
- Attribute format drop-down: select **String**
- Attribute value field: enter the **pool name** for the account. Repeat this process if more than one pool will be accessed by the account.



The Attribute Information window should look as follows:

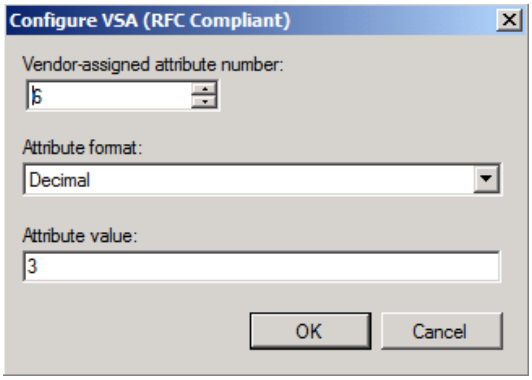


Example 2: Configuring Attribute Values for Volume Administrators

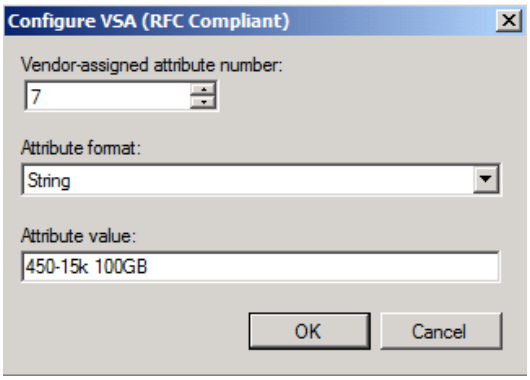
Similar to Pool Administrators the attributes for Volume Administrators use the same arguments with the exception of the administrative access level and a quota value after the pool name.

Configure the administrative level for the volume admin:

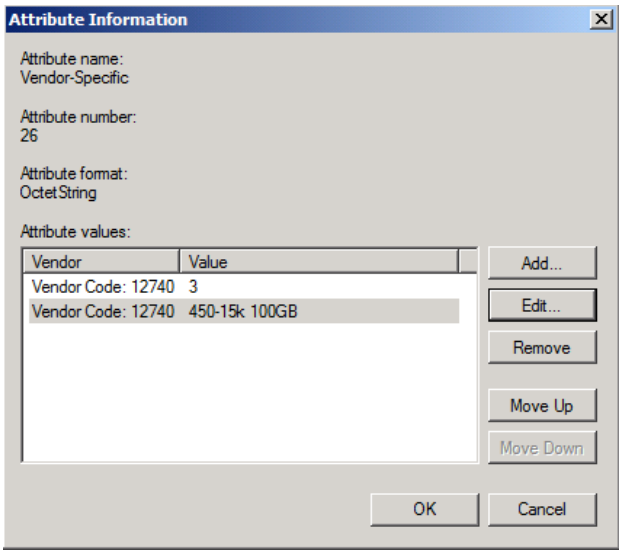
- Vendor-specific attribute number: enter **6**
- Attribute format drop-down: select **Decimal**
- Attribute value field: enter **3**



- Click **OK** twice to get back to the Attribute Information window.
- **Add** another Attribute Value to specify the PS Series pool and quota attributes. Use the same Vendor Code for network access server (12740) and choose "**Yes. It conforms**." Configure the attribute values as follows:
  - Vendor-assigned attribute number: enter **7**
  - Attribute format drop-down: select **String**
  - Attribute value field: enter the **pool name** and **quota value** for the account. For this example the pool name is `450-15k` and the quota is `100GB`. **Note:** The quota value is case insensitive.



The attribute information should now look similar to the following:



To add any additional or other optional vendor-specific attributes such as making this pool admin account read only, refer to Table 2 for their values.

Table 2: PS Series Optional Vendor Specific Attribute Values

Attribute	Field	Value	PS Series Supported Firmware
EQL-Admin-Full-Name	Attribute Number	1	All Versions
	Attribute Format (Syntax)	String (Max. length: 247)	
	Attribute Value	Name of person assigned to the account	
EQL-Admin-Email	Attribute Number	2	All Versions
	Attribute Format (Syntax)	String (Max. length: 247)	
	Attribute Value	Email address of person assigned to the account	
EQL-Admin-Phone	Attribute Number	3	All Versions
	Attribute Format (Syntax)	String (Max. length: 247)	
	Attribute Value	Phone number of person assigned to the account	
EQL-Admin-Mobile	Attribute Number	4	All Versions
	Attribute Format (Syntax)	String (Max. length: 247)	
	Attribute Value	Mobile number of person assigned to the account	
EQL-Admin-Poll-Interval	Attribute Number	5	All Versions
	Attribute Format (Syntax)	Integer (Max length: 6 numerals)	
	Attribute Value	Number of seconds until the group configuration data must be re-polled by the GUI. Default is 30 seconds.	
EQL-Admin	Attribute Number	6	Value 0 – All Versions
	Attribute Format (Syntax)	Decimal	Values 1, 2 – Version 3.2.x and

	Attribute Value	**0** = Global Admin, **1**=Pool Admin only, **2**=Pool Admin with group read access, **3**=Volume Admin	higher Value 3 – Version 5.0.x
EQL-Pool-Access	Attribute Number	7	Version 3.2 and higher *Use unlimited to set an unlimited quota for the pool, (example: `Pool1 unlimited`). If no unit is specified, the default capacity unit is MB.
	Attribute Format (Syntax)	String (Max. length: 247)	
	Attribute Value	Value is the pool name. The quota for volume administration accounts is expressed as *PoolName Quota*, with G and M appended to the quota representing GB and MB, respectively. For example: `Pool1 25G` sets the quota for Pool1 to 25GB and `Pool1 500M` sets a quota of 500MB.	
EQL-Replication-Site-Access	Attribute Number	8	Version 5.0 and higher
	Attribute Format (Syntax)	String (Max. length: 249)	
	Attribute Value	Indicating a comma-separated list of replication site names	
EQL-Admin-Account-Type	Attribute Number	9	Version 5.0 and higher *To create a read-only account, set the `EQL-Admin` value to `0` and the `EQL_Admin-Account-Type` to `RO`.
	Attribute Format (Syntax)	String (Max. length: 249)	
	Attribute Value	RO or RW - Indicating whether the account is read-only or read-write	

CONFIGURING RADIUS FOR ISCSI AUTHENTICATION TO PS SERIES GROUPS

CHAP, Challenge-Handshake Authentication Protocol can also be used for authentication with RADIUS clients to a PS Series group. This is useful for controlling standard iSCSI authentication to PS Series volumes through Active Directory services.

Using iSCSI authentication with RADIUS requires passwords to be stored using reversible encryption. This setting may need to be changed for the domain policy using the Group Policy editor for the domain profile. Once in the group policy editor navigate to Computer Configuration – Windows Settings – Security Settings – Account Policies – Password Policy and enable this setting for the domain group policy.

Note: It is recommended to add RADIUS Clients for each of the enabled PS array IP ports. This includes the PS Series group IP and all the enabled controller port IPs on the arrays in the group. This allows CHAP connections through multiple ports for redundancy and performance benefits.

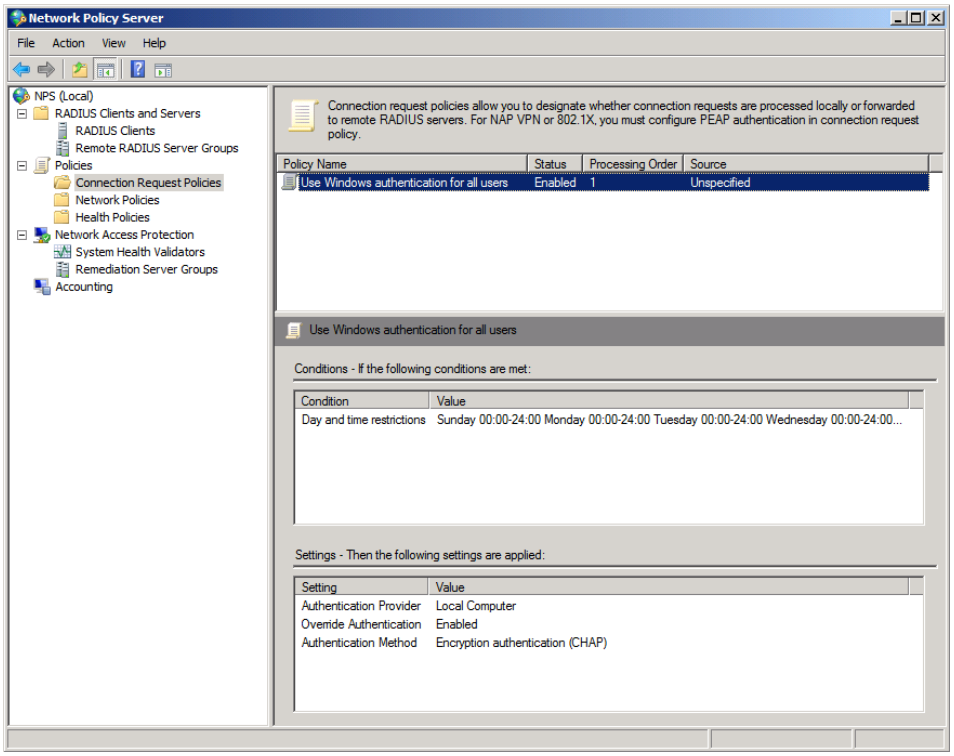
Follow these steps to configure RADIUS with CHAP authentication:

Configuring the Windows Server 2008 NPS

On the Windows Server 2008 NPS server navigate to **NPS – Policies – Connection Request Policies**

Open the built-in default policy – **Use Windows authentication for all users**, (Figure 17).

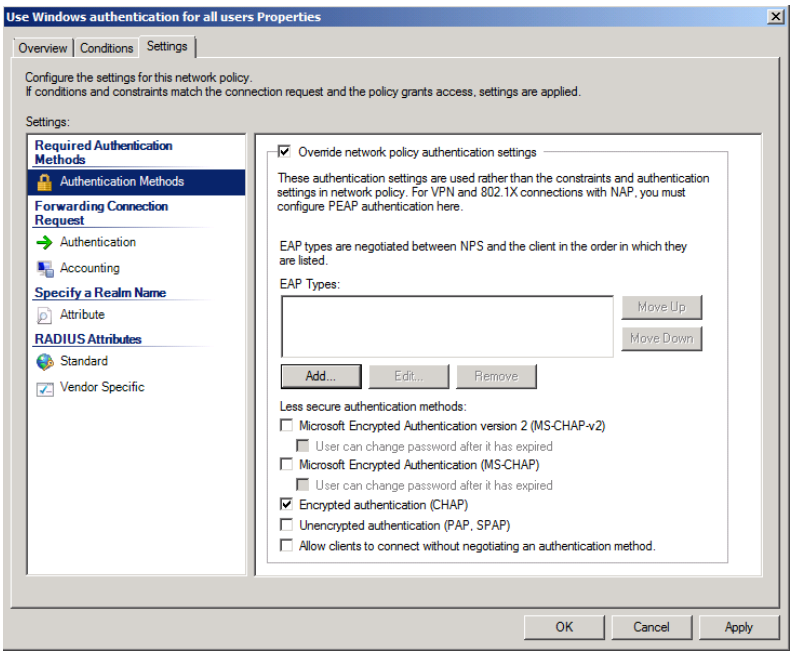
Figure 17: Built-in Policy 'Use Windows authentication for all users'



Open the policy and verify the policy is enabled. Under **Network connection method**, be sure the **Type of network access server** radial button is selected and **Unspecified** is shown in the drop down box.

Select the **Settings** tab. In the settings window check the box next to **Encrypted authentication (CHAP)** and uncheck everything else, (Figure 18).

Figure 18: Configure the Policy with CHAP Authentication



Click OK when finished to close the window.

Create new users to use the policy. The new users will be the CHAP username given to the PS Series volume access control. Set the users up the same way described in the section Creating Users and Groups for SAN Administration. Make sure you check the box to *Store password using reversible encryption* in the **Account** tab. There is no need to create additional user groups in this case because the CHAP users will use the default **Domain Users** group for authentication.

Configuring the Windows Server 2003 IAS

In Windows Server 2003 IAS the steps are slightly different. A remote access policy will need to be created similar to those described in Appendix A in this document.

On the Windows 2003 IAS server open Internet Authentication Services and create a new remote access policy. Select a custom policy and give the policy a recognizable name.

In the policy conditions **Add** a new condition and select **Authentication-Type** as the attribute.

This will open the Authentication-Type window. Select **CHAP** and add it to the **Selected types:** area and click OK.

Select **Next >** to progress to the next screen. In the **Permissions** screen, select **Grant remote access permission** to enable remote access for the policy and click **Next >**.

Select the **Edit Profile…** option to start the **Dial-in Profile** configuration.

In the Dial-in Profile settings navigate to the **IP** tab and verify that the **Server settings determine IP address assignment** option is the only option checked.

Now navigate to the **Authentication** tab and uncheck everything except the **Encrypted authentication (CHAP)** option. If this box is not checked, check it now.

Navigate to the **Encryption** tab and uncheck everything except **No encryption**. If this box is not checked, check it now.

Finally navigate to the **Advanced** tab and remove the **Framed-Protocol** attribute. Edit the **Service-Type** attribute and change it to **Administrative**.

Finish the policy by clicking **OK** and **OK** to save and close the policy wizard.

Create new users to use the policy. The new users will be the CHAP username specified when configuring access control to the PS Series volume. Set the users up the same way described in the section Creating Users and Groups for SAN Administration. Make sure you check the box to *Store password using reversible encryption* in the **Account** tab. There is no need to create additional user groups in this case because the CHAP users will use the default **Domain Users** group for authentication.

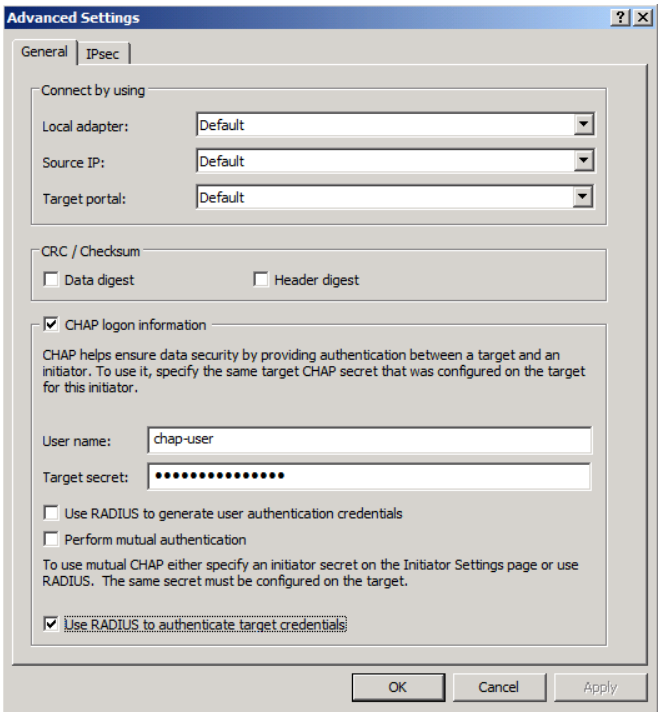
Connecting to Volumes

Depending on what operating system is being used the volume connection steps may vary.

From a server or host running Windows Server 2008 or Windows 7:

- Open the iSCSI Initiator Properties
- Select the **RADIUS** tab and add the IP or DNS name of the RADIUS server granting access to the PS Series volumes.
- If a shared secret was used then verify authentication by providing the secret.
- Select the **Discovery** tab and verify the PS group IP is in the Target portals window.
- Select the **Targets** tab and refresh to view volumes. Any configured volumes should show up.
- Log onto a configured volume by selecting **Log on…**
- Choose the **Advanced**… button to open the **Advanced Settings** window.
- In the Advanced Settings window select the box next to **CHAP logon information** and add the CHAP user name and target secret for authentication.
- Select the box next to **Use RADIUS to authenticate target credentials** (Figure 19) and hit **OK** and **OK** to complete the process.

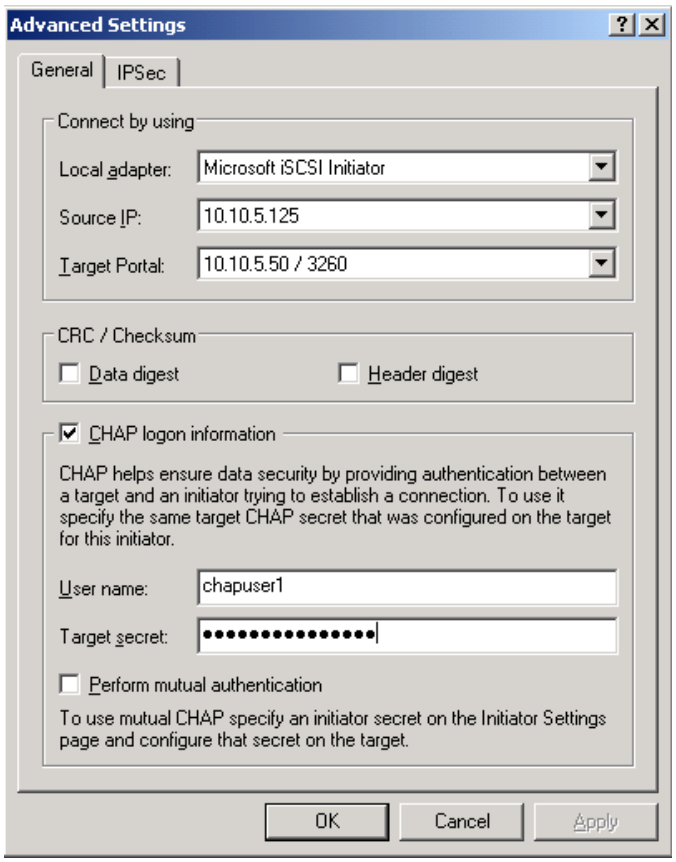
Figure 19: Volume Log-On Using CHAP – Windows 2008



From a server or host running Windows Server 2003 or Windows XP

- Open the iSCSI Initiator Properties
- Select the **Discovery** tab and verify the PS group IP is in the Target portals window.
- Select the **Targets** tab and refresh to view volumes. Any configured volumes should show up.
- Log onto a configured volume by selecting **Log on…**
- Choose the **Advanced**… button to open the **Advanced Settings** window.
- In the Advanced Settings window modify the **Connect by using** section as follows:
    - Local adapter: Microsoft iSCSI Initiator
    - Source IP: [This is the IP of the RADIUS server]
    - Target Portal: [The portal IP of the PS group]
- Select the box next to **CHAP logon information** and add the CHAP user name and target secret for authentication (Figure 20).
- Hit **OK** and **OK** to complete the process.

Figure 20: Volume Log-On Using CHAP – Windows 2003



APPENDIX A – CONFIGURATION STEPS ON WINDOWS SERVER 2003

This procedure assumes you will install and configure IAS on the same server hosting Active Directory.

Perform the following steps to install and configure the IAS Server:

- Click **Start** > **Control Panel** > **Add or Remove Programs**.
- Click **Add/Remove Windows Components**.
- In the Windows Components dialog box, select **Networking Services**, then click **Details**.
- In the Networking Services dialog box, check the box for **Internet Authentication Service**, then click **OK**.
- You return to the Windows Components dialog box. Click **Next**.
- On the Completing the Windows Components Wizard screen, click **Finish**.

After installing IAS, you must make some modifications to the configuration, as follows:

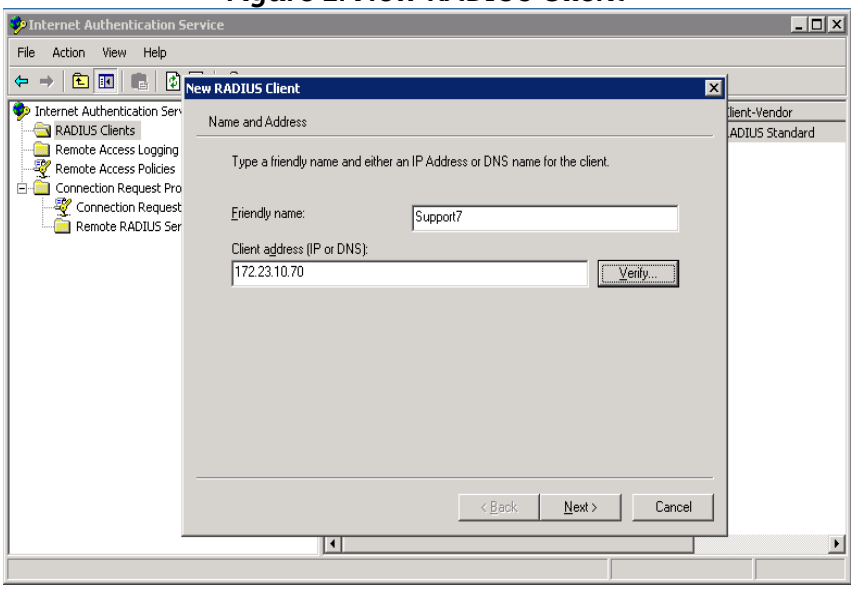
- Click **Start** > **Administrative Tools** > **Internet Authentication Services**.
- In the Internet Authentication Services console, right-click **Internet Authentication Service (Local)**, then click **Register Server in Active Directory**. This setting allows the IAS Server to authenticate users in the Active Directory domain.
- Click **OK**.

Configuring a PS Series Group as a RADIUS Client on the IAS Server

To set up the PS Series group as a RADIUS client on IAS:

- Click **Start** > **Administrative Tools** > **Internet Authentication Service**.
- Right-click the **RADIUS Clients** folder.
- Click **New** > **RADIUS Client**.

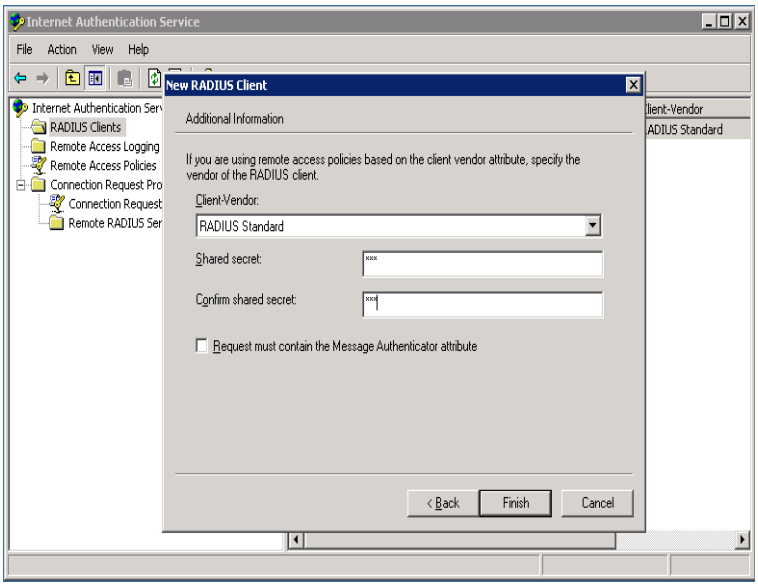
Figure 1: New RADIUS Client



Enter the following information:

- In the **Friendly name** field, enter a name for the client. We suggest using the PS Series group name.
- In the **Client address** field, enter the PS Series group IP address. (Verifying the address is optional.)
- Click **Next**. The Additional Information dialog box is displayed.

Figure 2: New RADIUS Client – Additional Information



In the Additional Information dialog box, do the following:

- In the **Client-Vendor** drop-down list, select **RADIUS Standard**, if not already selected.
- Enter and confirm a **shared secret** (password). Remember or make a note of the secret, as you will need to specify the same secret (password) in a later step on the PS Series group.
- Select or deselect the checkbox next to **Request must contain the Message Authenticator attribute**, as you prefer. EqualLogic supports this attribute, but whether you require it depends on your security policies.
- Click **Finish**.

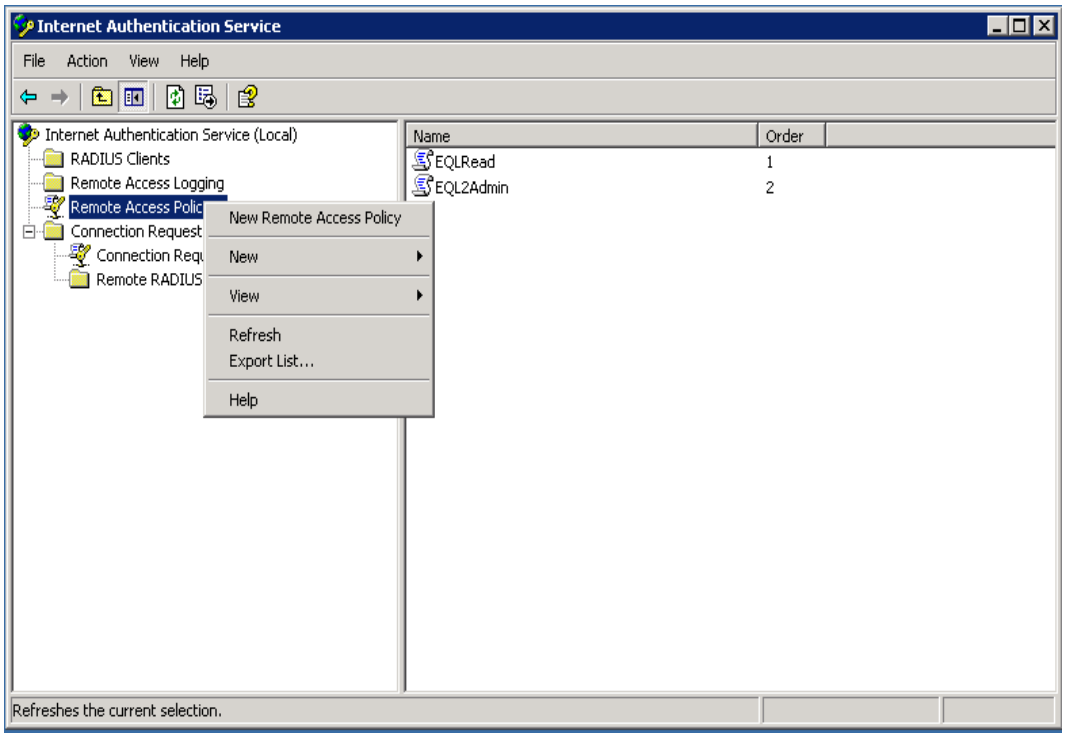
Creating Remote Access Policies on the IAS Server

Similar to a Network Policy, a remote access policy applies to a user profile (in Active Directory) and tells the RADIUS server what type of privilege to grant a user who attempts to log in to a PS Series group.

To create a Remote Access Policy for PS Series group administrators on the IAS Server:

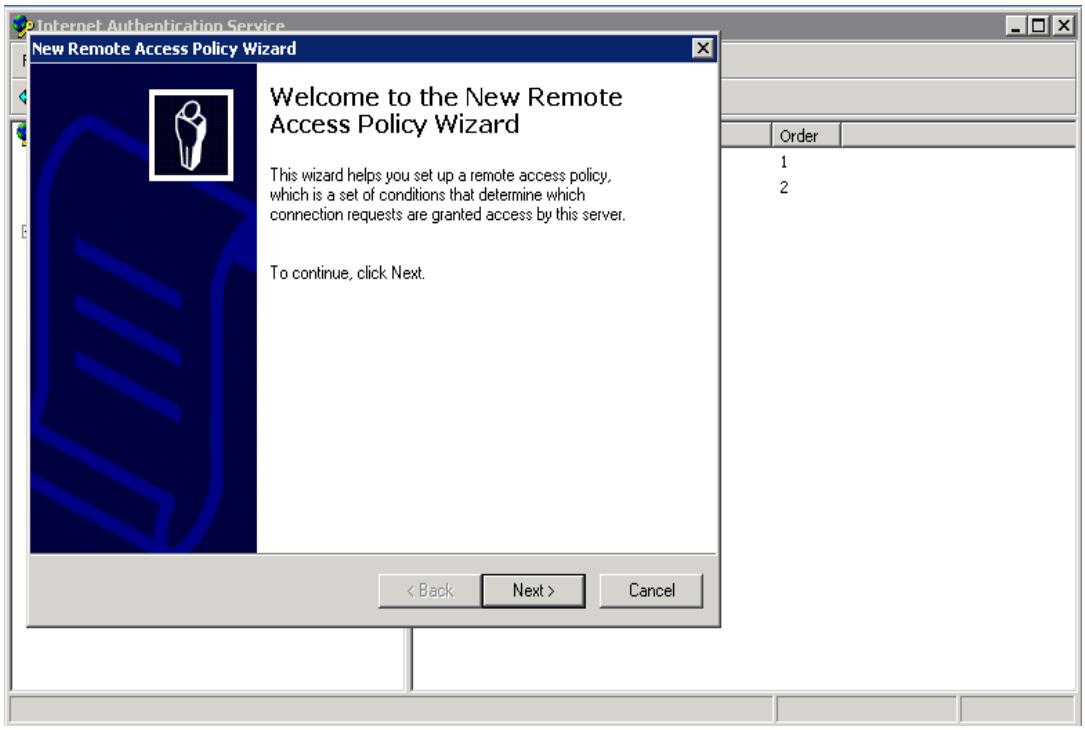
- Click **Start** > **Administrative Tools** > **Internet Authentication Service**.
- Right-click **Remote Access Policy**, and click **New Remote Access Policy** (Figure 3).

Figure 3: IAS – Create New Remote Access Policy



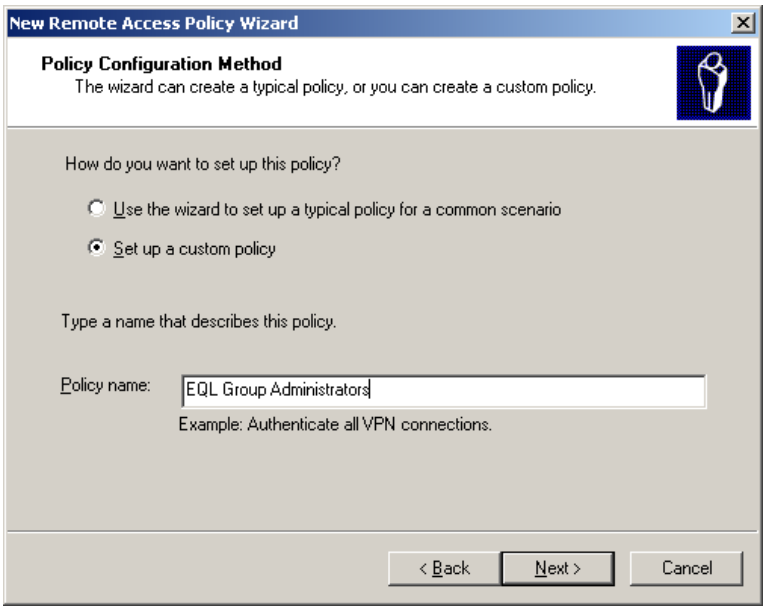
- The New Remote Access Policy Wizard starts (Figure 4).

Figure 4: New Remote Access Policy Wizard



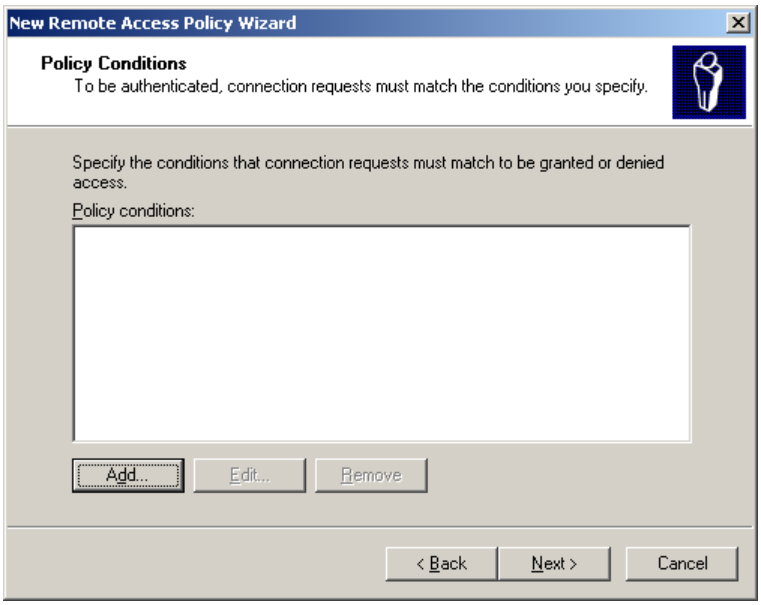
- Click **Next**. The Policy Configuration Method screen appears (Figure 5).

Figure 5: Policy Configuration Method



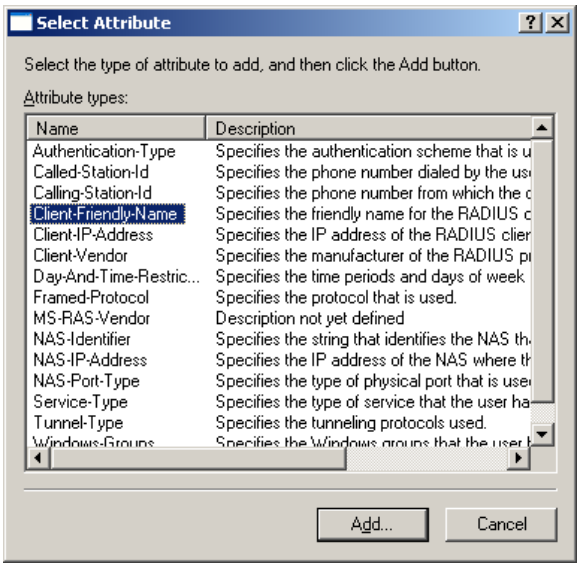
- Select **Set up a custom policy**, and enter a name for the policy; for example, EQL Group Administrators. Then, click **Next**.
- The Policy Conditions screen appears (Figure 6).

Figure 6: Policy Conditions



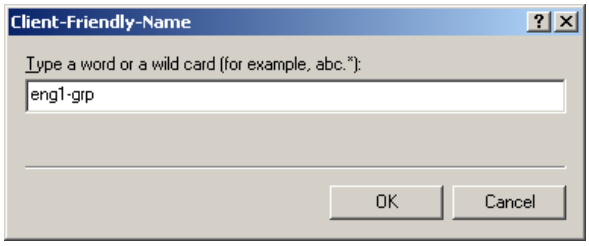
- Under the Policy Conditions field, click **Add**.
- The Select Attribute screen appears (Figure 7).

Figure 7: Select Attribute



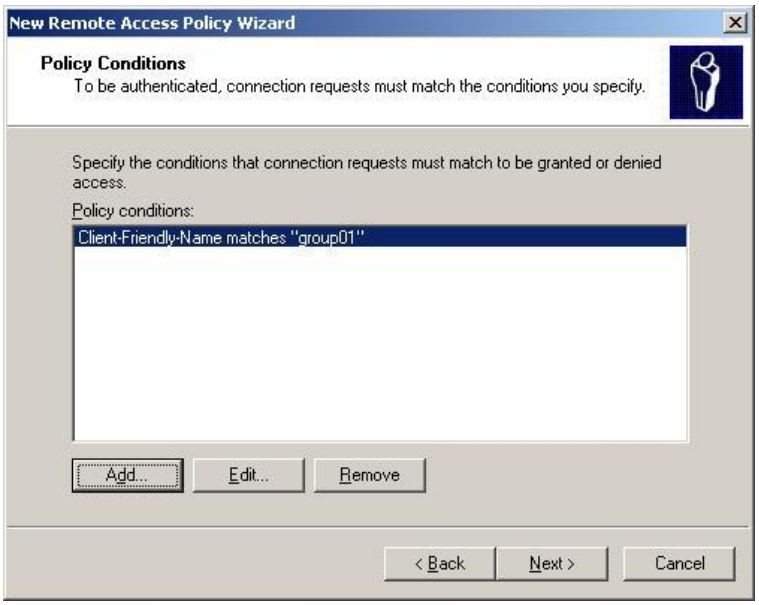
- Select **Client-Friendly-Name** and click **Add**.
- The Client-Friendly Name screen appears (Figure 8).

Figure 8: Client-Friendly Name



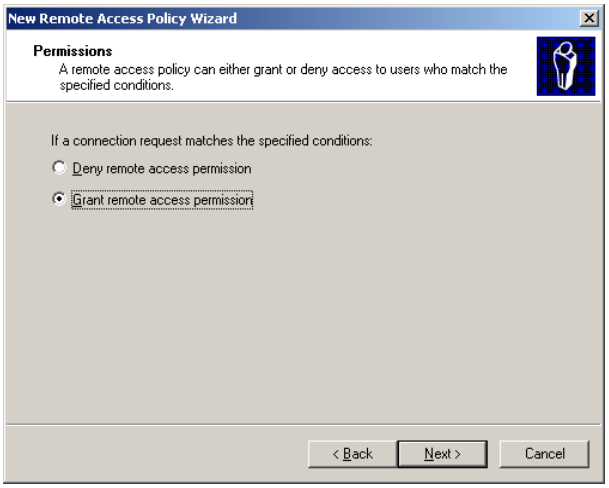
- Enter the PS Series group name you specified in Overview of Steps
- Optionally repeat this process and enter the Windows Group that the policy will be created for here.
- Verify the information is correct in the Policy conditions list (Figure 9), then click **Next**.

Figure 9: Policy Conditions (Completed)



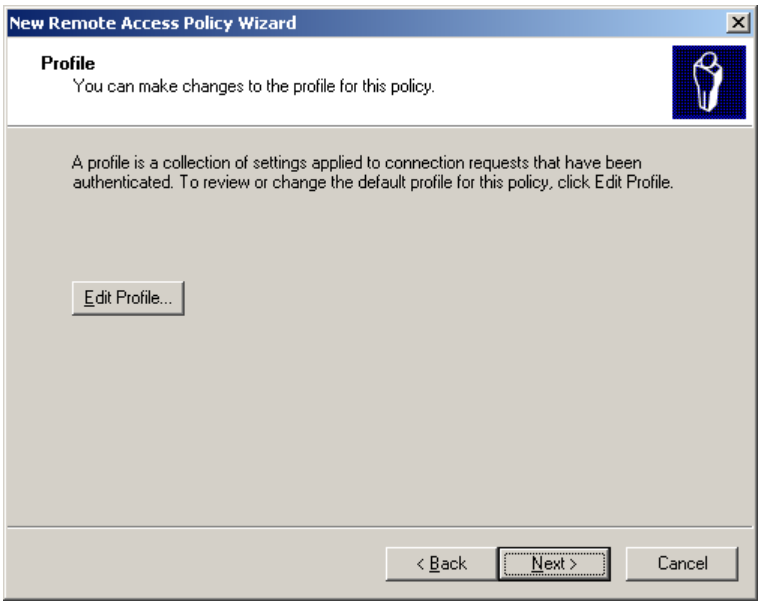
- The Permissions screen appears (Figure 10).

Figure 10: Permissions



- Select **Grant remote access permission**, and click **Next**.
- The Profile screen appears (Figure 11).

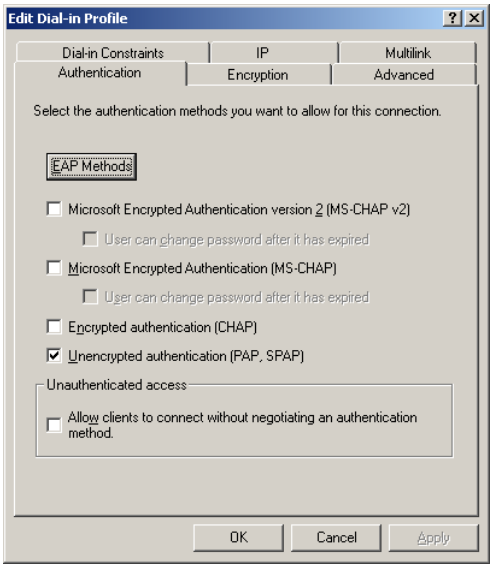
Figure 11: Profile



- Click **Edit Profile**, and do the following:
- On the Authentication tab (Figure 12), select **Unencrypted authentication** and deselect everything else.

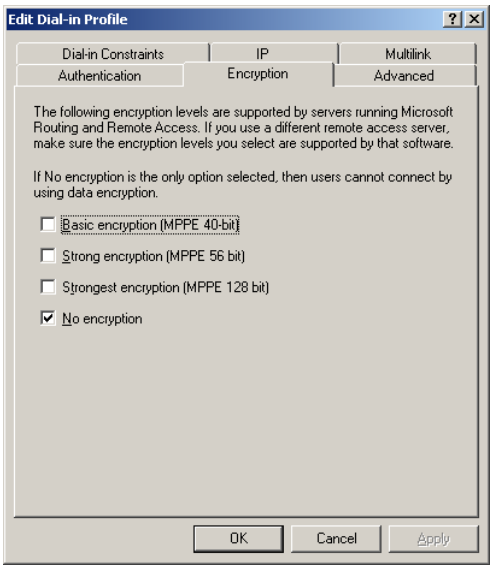
- **Note:** By default all passwords are encrypted by the RADIUS protocol. Choosing the unencrypted authentication here is simply for tunneling into the IAS server.

Figure 12: Edit Profile: Authentication



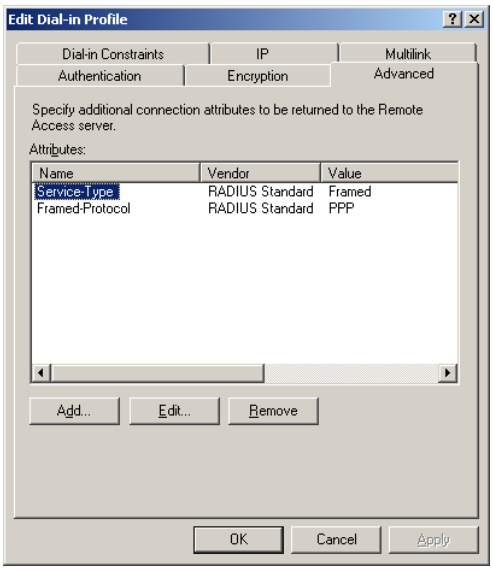
- On the Encryption tab (Figure 13), select **No encryption** and deselect everything else.

Figure 13: Edit Profile: Encryption



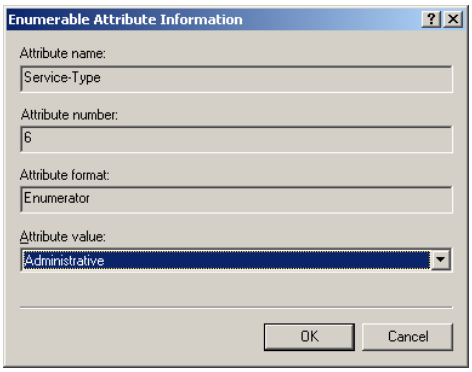
- On the Advanced tab (Figure 14), select **Framed-Protocol** and click **Remove**.
- Then select **Service-Type** and click **Edit** (Figure 14).

Figure 14: Edit Profile: Advanced



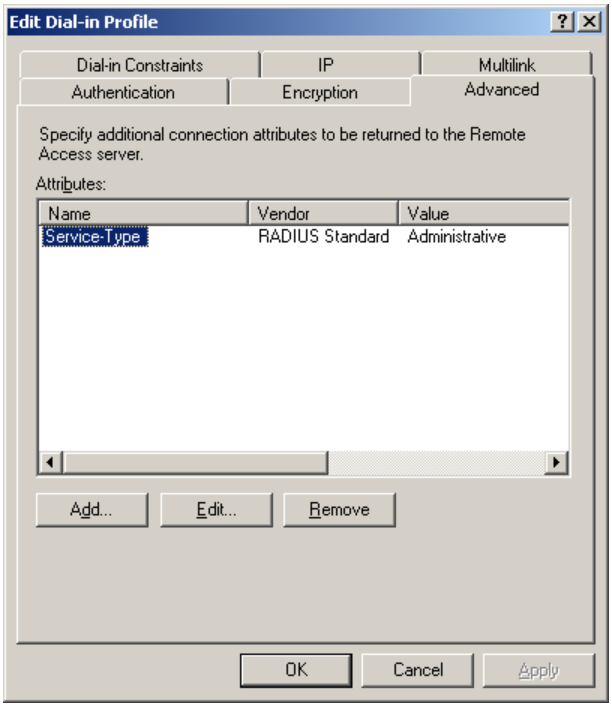
- The Enumerable Attribute Information screen appears (Figure 15).

Figure 15: Enumerable Attribute Information



- In the Attribute value list, select **Administrative** and click **OK**. The Administrative attribute grants full read-write access to the PS Series group.
- You return to the Edit Profile: Advanced screen, **w**hich should now look like Figure 16.

Figure 16: Edit Profile: Advanced (Modified)



Leaving this screen visible, continue with Adding the PS Series Vendor-Specific Attributes.

Adding the EqualLogic Vendor-Specific Attributes

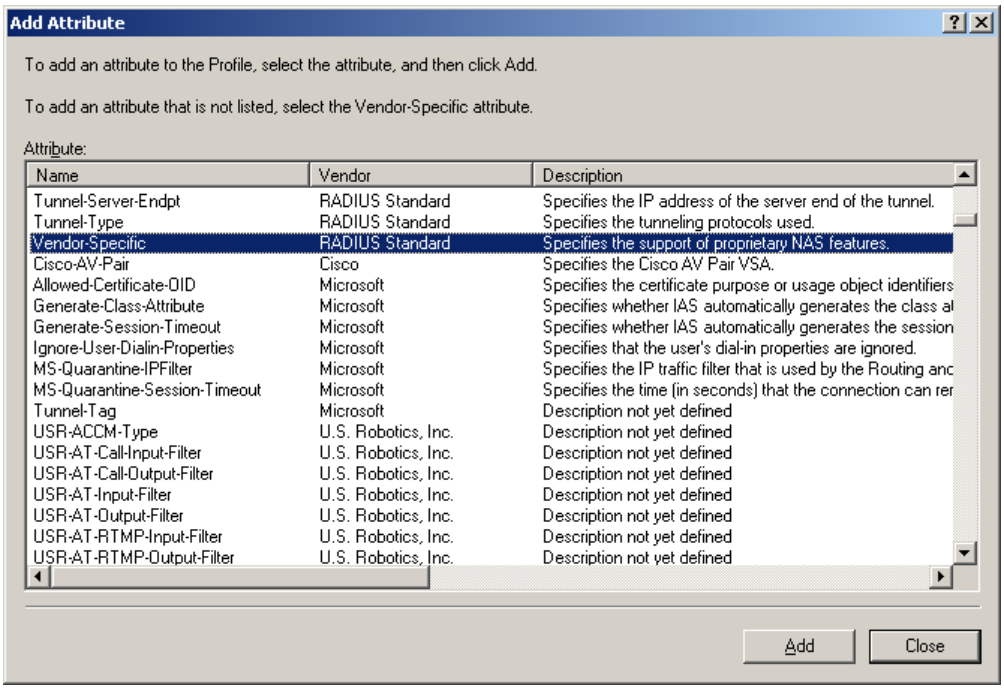
The following procedure continues from Creating Network Policies on the NPS Server, and assumes the Edit Dial-In Profile screen is still displayed.

To add vendor-specific attributes for EqualLogic:

- On the Edit Dial-In Profile – Advanced tab, click **Add**.

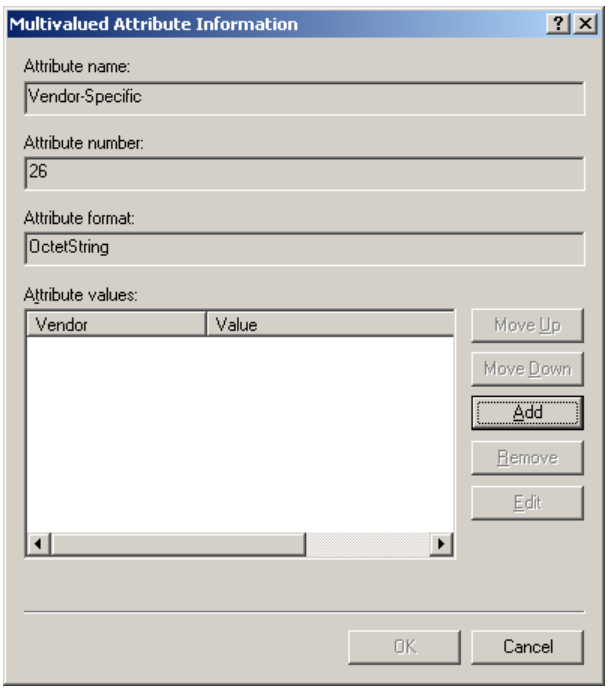
- In the Add Attribute dialog box (Figure 17), select **Vendor-Specific** and click **Add**.

Figure 17: Add Attribute



- In the Multivalued Attribute Information dialog box (Figure 18), click **Add**.

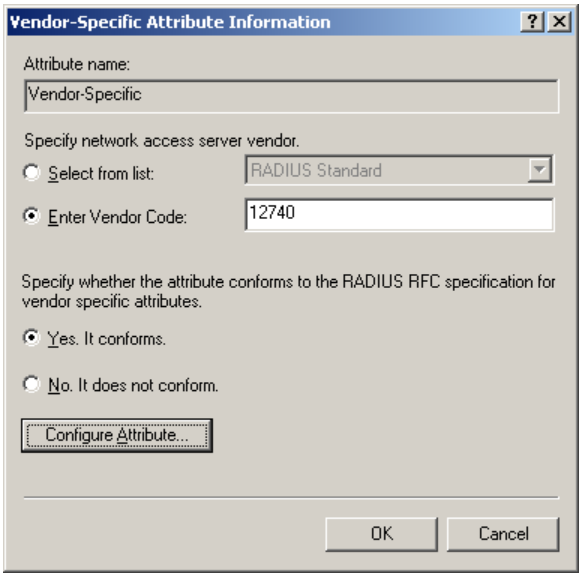
Figure 18: Multivalued Attribute Information



- In the Vendor-Specific Attribute Information dialog box (Figure 19), do the following:

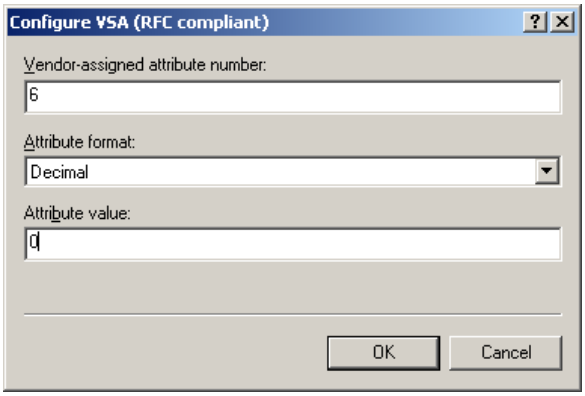
- Select **Enter Vendor Code**, and enter **12740** in the field. This is the vendor code for EqualLogic, Inc.
- Select Yes, It conforms, then click Configure Attribute.

Figure 19: Vendor-Specific Attribute Information



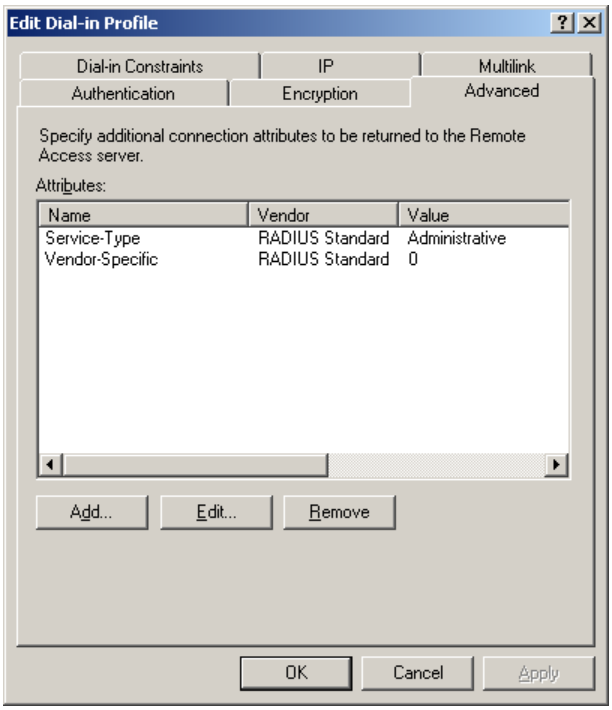
- The Configure VSA dialog box is displayed (Figure 20).

Figure 20: Configure VSA



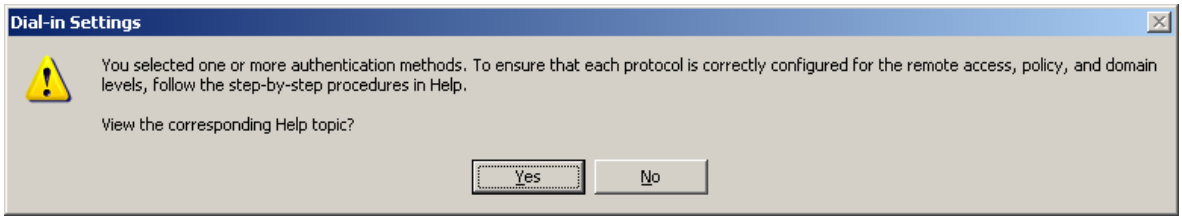
- Enter the following information for the EQL-Admin attribute:
  - In the Vendor-assigned attribute number field, enter **6**.
  - In the Attribute format drop-down list, select **Decimal**.
  - In the Attribute value field, enter **0** (for a group administrator).
- Click **OK**.
- Continue to close windows until you reach the **Edit Dial-in Profile** screen.
- On the Advanced tab (Figure 21), verify the information is correct, then click **OK**.

Figure 21: Edit Dial-In Profile: Advanced (with new VSA)



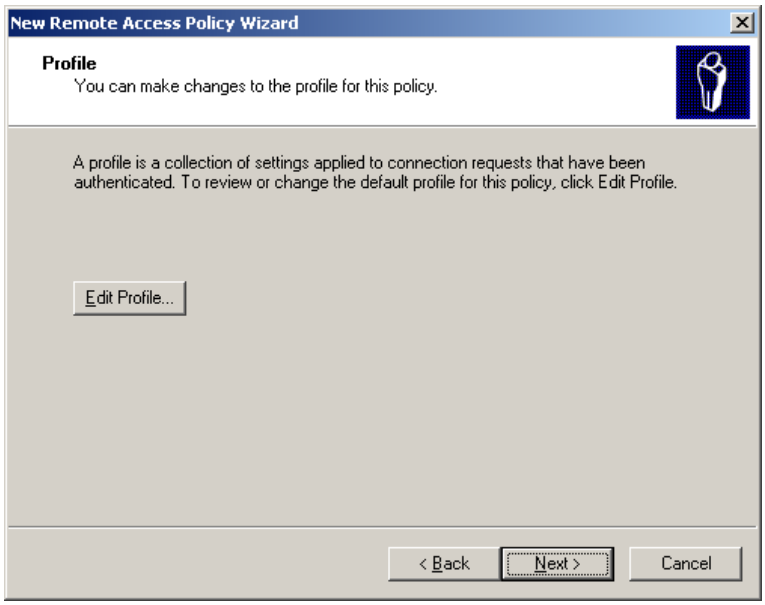
- The Dial-in Settings confirmation box is displayed (Figure 22), asking if you want to view online help about protocol configuration. Click **No**.

Figure 22: Dial-In Settings



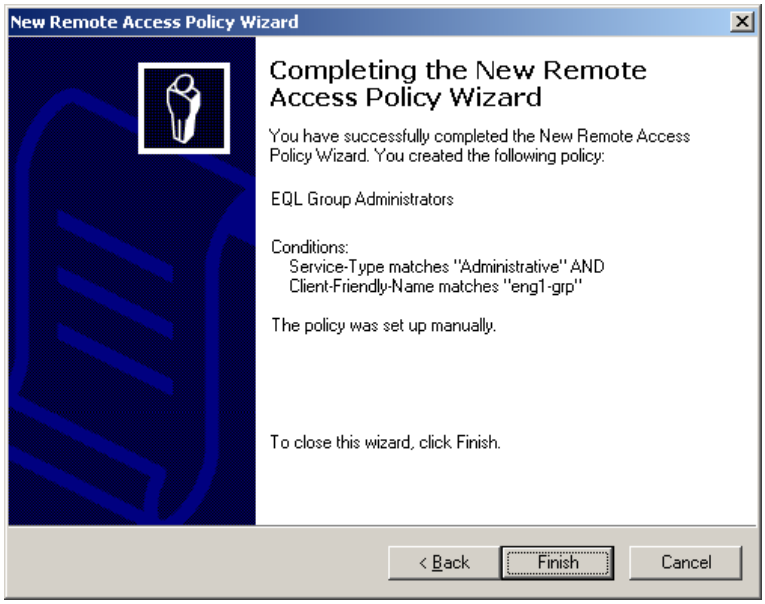
- On the Profile screen (Figure 23), click **Next**.

Figure 23: Profile



- On the Completing the New Remote Access Policy Wizard screen (Figure 24), click **Finish**.

Figure 24: Completing the Wizard



APPENDIX B: CONFIGURING RADIUS ON THE PS SERIES GROUP USING CLI

To configure the PS Series group using the command-line interface log in to the Command Line Interface for the group using the group IP address and a group administrator account, such as grpadmin.

Enter the following command to enable RADIUS logins:

```
grpparams login-radius-auth enable
```

Enter the following command to add the IP address of the RADIUS server (or servers), separated by commas and no spaces. The servers will be consulted in the order they are listed.

```
grpparams radius-auth-list 123.45.6.789,234.5.67.89
```

Enter the following command to add the password (secret) you configured in Overview of Steps

```
grpparams radius-auth-secrets secret
```

Optionally, enter the following command to disable the requirement for the EQL-Admin RADIUS return attribute. Disabling this requirement treats every user who attempts to log in as though they have group administration permission; effectively, this allows unrestricted logins from all users in the RADIUS database to the PS Series group (and is not recommended).

```
grpparams login-radius-attr disable
```

Optionally, enter the following command to increase the timeout interval for login attempts through the RADIUS server. The default is 2 seconds. Increase the timeout interval if you are having performance issues with login requests.

```
grpparams radius-auth-timeout 5
```

Optionally, enter the following command to increase the allowed number of login retries before blocking the user from logging in again interval for login attempts through the RADIUS server. The default is 2 seconds. Increase the timeout interval if you are having performance issues with login requests.

```
grpparams radius-auth-retries 3
```

Optionally, verify your RADIUS settings by running the following command and checking the output:

```
grpparams show
.
.
.
_____________________ Radius Information _____________________________
radius-auth-list:                       login-radius-auth: enabled
radius-auth-retries: 3                  radius-auth-timeout:  5secs
login-radius-acct: disabled      radius-acct-retries: 1
radius-acct-timeout:  2secs      iscsi-radius-auth: disabled
iscsi-local-auth: enabled        radius-acct-list:
login-radius-attr: enabled       radius-auth-secrets:
radius-acct-secrets:
```

TECHNICAL SUPPORT AND CUSTOMER SERVICE

Dell's support service is available to answer your questions about PS Series SAN arrays. If you have an Express Service Code, have it ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

Contacting Dell

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services might not be available in your area.

For customers in the United States, call 800-945-3355.

Note: If you do not have access to an Internet connection, contact information is printed on your invoice, packing slip, bill, or Dell product catalog.

Use the following procedure to contact Dell for sales, technical support, or customer service issues:

1. Visit support.dell.com or the Dell support URL specified in information provided with the Dell product.
2. Select your locale. Use the locale menu or click on the link that specifies your country or region.
3. Select the required service. Click the "Contact Us" link, or select the Dell support service from the list of services provided.
4. Choose your preferred method of contacting Dell support, such as e-mail or telephone.

Online Services

You can learn about Dell products and services using the following procedure:

1. Visit www.dell.com (or the URL specified in any Dell product information).
2. Use the locale menu or click on the link that specifies your country or region