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Nortel Secure Network Access 2.0
Engineering

> Nortel Secure Network Access 2.0 802.1X Authentication Technical Configuration Guide

Enterprise Business Solutions
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Abstract

This document provides an overview on how to configure the Nortel Secure Network Access Switch to authenticate Wired and Wireless LAN Microsoft Windows workstations using PEAP against the Local Database or Active Directory.

Revision Control

No	Date	Version	Revised by	Remarks
1	07/08/2008	1.0	EBS	Initial draft and first release internally. Approved by PLM
2	08/05/2008	2/0	EBS	PLM approved for external release.

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Tables:

Document Updates:

Not Applicable

Conventions:

This section describes the text, image, and command conventions used in this document.

Symbols:

Tip – Highlights a configuration or technical tip.

Note – Highlights important information to the reader.

Warning – Highlights important information about an action that may result in equipment damage, configuration or data loss.

Text:

Bold text indicates emphasis.

Italic text in a Courier New font indicates text the user must enter or select in a menu item, button or command:

ERS5520-48T# ***show running-config***

Output examples from Nortel devices are displayed in a Lucinda Console font:

ERS5520-48T# ***show running-config***

```
! Embedded ASCII Configuration Generator Script
! Model = Ethernet Routing Switch 5520-24T-PWR
! Software version = v5.0.0.011
enable
configure terminal
```

1. Overview:

This document provides an overview on how to configure the Nortel Secure Network Access Switch to authenticate Wired and Wireless Microsoft Windows XP and Vista workstations using PEAP against the Local User Database or Active Directory.

1.1 Topology:

Figure 1.1 shows the topology that will be used in this configuration guide using the following Nortel and Microsoft platforms:

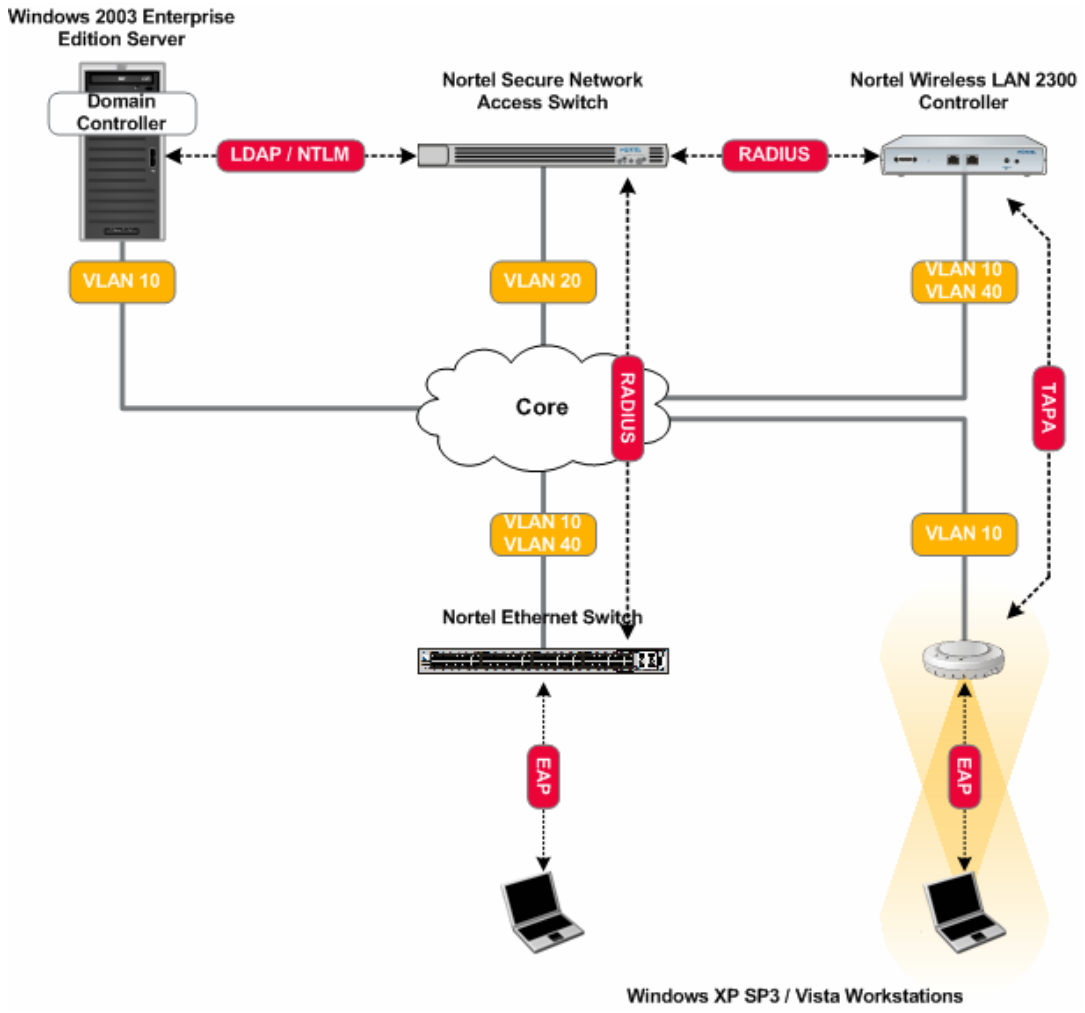


Figure 1.1 – Topology

- The Nortel Secure Network Access Switch will be configured to support PEAP Authentication from the Windows XP and Vista workstations and authenticate the users against the Local User Database or Active Directory using NTLM. Additionally the Nortel Secure Network Access Switch will be configured to assign authenticated Wired and Wireless users to a user VLAN id 40.

- The Nortel Ethernet Routing Switch will be configured to support EAPOL clients and forward RADIUS authentication requests to the Nortel Secure Network Access Switch. Additionally the user VLAN id 40 will be created on the switch which will be dynamically assigned to authenticated wired users using standard IETF RADIUS return attributes from the Nortel Secure Network Access Switch.
- The Nortel WLAN 2300 Controller will be configured to support EAPOL clients and forward RADIUS authentication requests to the Nortel Secure Network Access Switch. Additionally the user VLAN id 40 named USERS1 will be created on the controller which will be dynamically assigned to authenticated users using standard IETF RADIUS return attributes from the Nortel Secure Network Access Switch.
- The Microsoft Windows 2003 Server will be configured with the appropriate Active Directory User and Group objects to support user authentication and group associations. During authentication the Nortel Secure Network Access Switch will perform NTLM user authentication against Active Directory and using LDAP lookup will determine the user's group membership which will determine the VLAN outcome based on compliance state.
- The Microsoft Windows Workstations will be configured to perform Single Sign-On PEAP authentication to the Nortel Ethernet Switch and Nortel WLAN 2300 Controller. Upon successful PEAP authentication the wired and wireless users will be placed into a user VLAN id 40.

This document provides configuration details for Nortel and Microsoft components shown in figure 1.0 but does not address installation of the core Windows operating systems or services such as Active Directory, DHCP, DNS or Certificate Services. These topics are out of the scope of this document and the reader should reference the appropriate vendor documentation.

1.2 Pre-Requisites:

This document makes the following assumptions in regards to the Network Infrastructure, Windows 2003 server, Windows XP workstation and Windows Vista workstations:

1. A Windows 2003 Advanced or Enterprise Server is installed with the following:
    a. Latest service pack and updates installed
    b. The following services have been installed:
        i. Active Directory (Domain Controller).
        ii. Certificate Services (Enterprise Root CA).
        iii. Domain Name Services (DNS).
        iv. Dynamic Host Configuration Protocol (DHCP).
        v. Internet Information Services (IIS).
    c. A server certificate with public key has been issued from the Enterprise Root CA and has been exported as a PKCS#12 file.
    d. A CA root certificate has been issued from the Enterprise Root CA and has been exported to a file.
    e. The server can ping the Nortel Secure Network Access Switch.
2. Windows XP / Vista Workstations with the following:
    a. Latest service pack and updates installed.

   b. The workstation is a member of the Domain.
   c. A CA Root certificate issued from the Enterprise Root CA is installed.

3. A core routing switch is in place and has been configured to provide inter-VLAN routing and DHCP forwarding services.

2. Configuration:

2.1 Nortel Secure Network Access Switch:

This section provides configuration steps required to configure a Nortel Secure Network Access Switch to authenticate clients EAP on a Nortel Ethernet Switch or Nortel WLAN 2300 controller using Protection EAP. For this section the following configuration steps will be performed:

1. Base Configuration (Section 2.1.1)
2. Certificates (Section 2.1.2)
3. Local Authentication (Section 2.1.3)
4. Active Directory Authentication (Section 2.1.4)
5. RADIUS Server (Section 2.1.5)
6. RADIUS Attributes (Section 2.1.6)

2.1.1 Base Configuration:

The following baseline configuration will performed on the Secure Network Access Switch:

- IP Addressing – The Real, Management and Virtual IP Addresses will be defined.
- DNS – DNS Server IP Address and Domain Name will be defined.
- Time – The Timezone and NTP Server IP Address will be defined.
- Management – The administrator password will be defined and the Browser Based Interface (BBI) enabled.

A baseline configuration may be established on the Secure Network Access Switch with a console connection using the following procedure:

1	Define the NSNAS base host configuration by issuing the following command on the NSNAS Setup Menu:

```
------------------------------------------------------------
[Setup Menu]
      join       - Join an existing cluster
      new        - Initialize host as a new installation
      boot       - Boot menu
      info       - Information menu
      exit       - Exit  [global command, always available]
>> Setup# new
```

2	Define the following parameters:
`Interface IP: 192.168.20.10`	The real IP address (RIP) assigned to the NSNAS.
`Network Mask: 255.255.255.0`	The network mask assigned to the NSNAS. In this example the NSNAS is deployed in an isolated VLAN but a smaller subnet with fewer host addresses could be utilized to save

	address space.
`VLAN Tag: 0`	Defines the 802.1Q tag used for the physical Ethernet interface. A value of 0 disables 802.1Q tagging.
`Two Armed Configuration: no`	This example utilizes a one-armed configuration.
`Default Gateway: 192.168.20.1`	The default gateway on the core used by the NSNAS.
`Management IP: 192.168.20.11`	Defines the management IP address for the NSNAS.
`DNS Server: 192.168.10.5`	The IP address of the Windows 2003 Enterprise Server providing DNS services.
`Generate SSH Host Keys: yes`	Generates a new SSH host keys used for SSH management and communication with SREM.
`Enter a password for the "admin" user: admin-password`	Enter and confirm the password assigned to the admin user account. The admin user has full access to the NSNAS.
`Run NSNAS quick configuration wizard?: yes`	Invokes a wizard which creates basic parameters that we will use to provide 802.1X authentication.
`NSNAS Portal Virtual IP address: 192.168.20.12`	The virtual IP address on the NSNAS used to provide DHCP, DNS and HTTP/HTTPS services to guest users.
`NSNAS Domain name: eselab.com`	The DNS domain name for the system. For this example the domain name is eselab.com.
`Create http to https redirect server: yes`	Allows the NSNAS to capture users HTTP sessions and re-direct the browser to the HTTPS portal login page for authentication.
`Create default tunnel guard user: no`	Local user accounts will not be used in this example.
`Create default system account: no`	Local host authentication will not be used in this example.
`Would you like to enable the Nortel TunnelGuard Desktop Agent? Yes`	The TunnelGuard desktop agent will not be required for this example but will be enabled.
`Enable secure web based configuration management: yes`	The browser based interface (BBI) will be enabled to perform the remaining configuration on the NSNAS.

2.1.2 Certificates:

A Server and CA Root Certificate issued from Windows 2003 Certificate Services will be installed on the Secure Network Access Switch to support PEAP authentication:

- Server Certificate – Issued from an Enterprise or Public Certification Authority and is used to secure client credentials during PEAP authentication.
- CA Root Certificate – Issued from an Enterprise or Public Certification Authority and is installed on the SNAS and Windows Workstations to verify the validity of all certificates issued from the Certification Authority.

In this example the server and CA root certificates were issued from Microsoft Certificate Services using the Web Enrolment tool and exported to a PKCS#12 file. The Server Certificate was issued with the Common Name (CN) nsnas-vip.eselab.com which resolves to the Virtual IP Address on the Secure Network Access Switch.

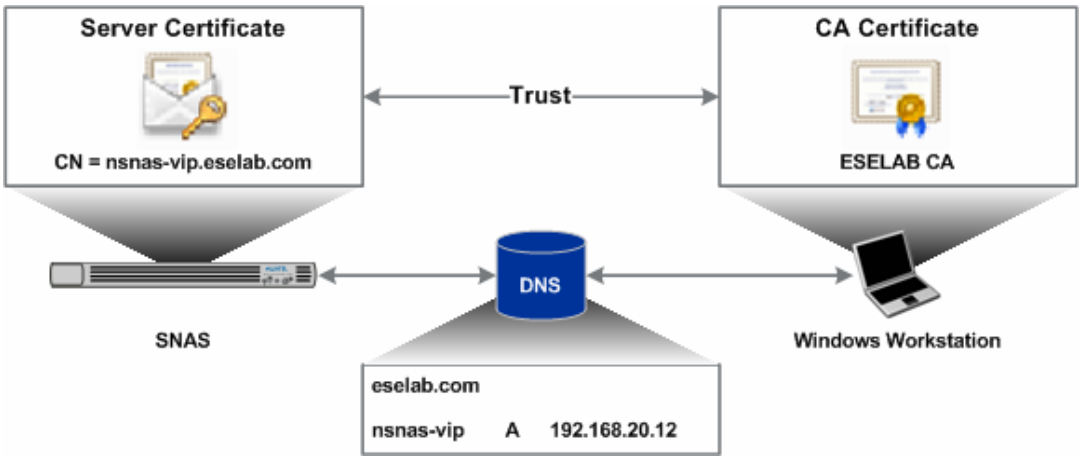
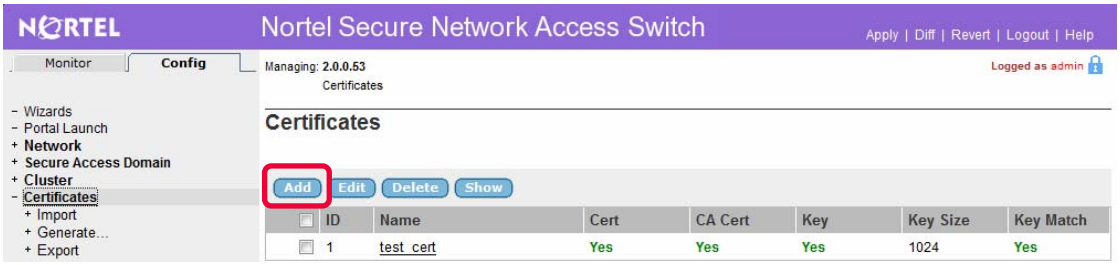


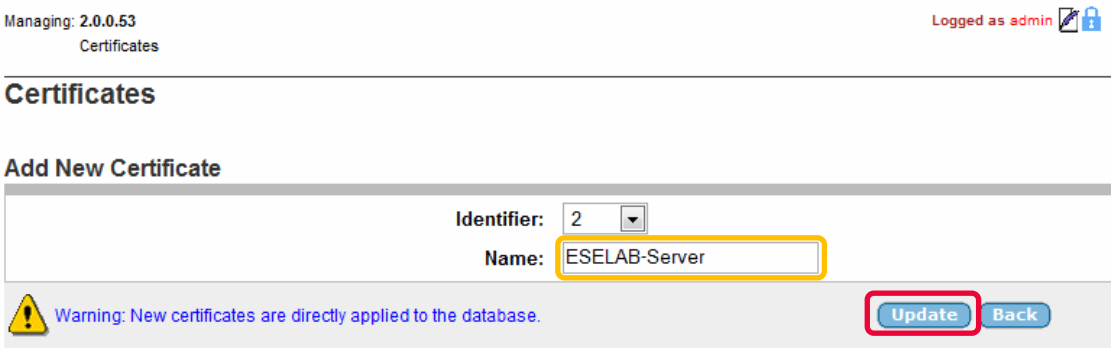
Figure 2.1.2 – Server Certificate

Certificates may be defined and installed on the Secure Network Access Switch using the Browser Based Interface with the following procedure:

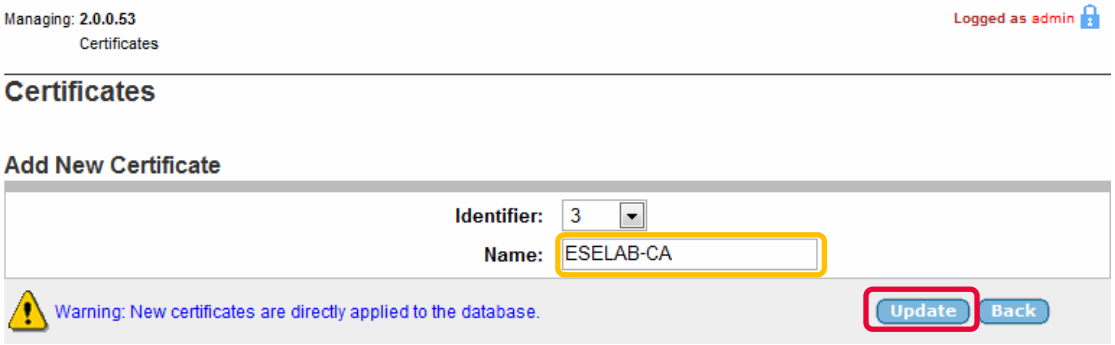
1 Using the Browser Based Interface (BBI) navigation tree click *Certificates* and then *Add*.



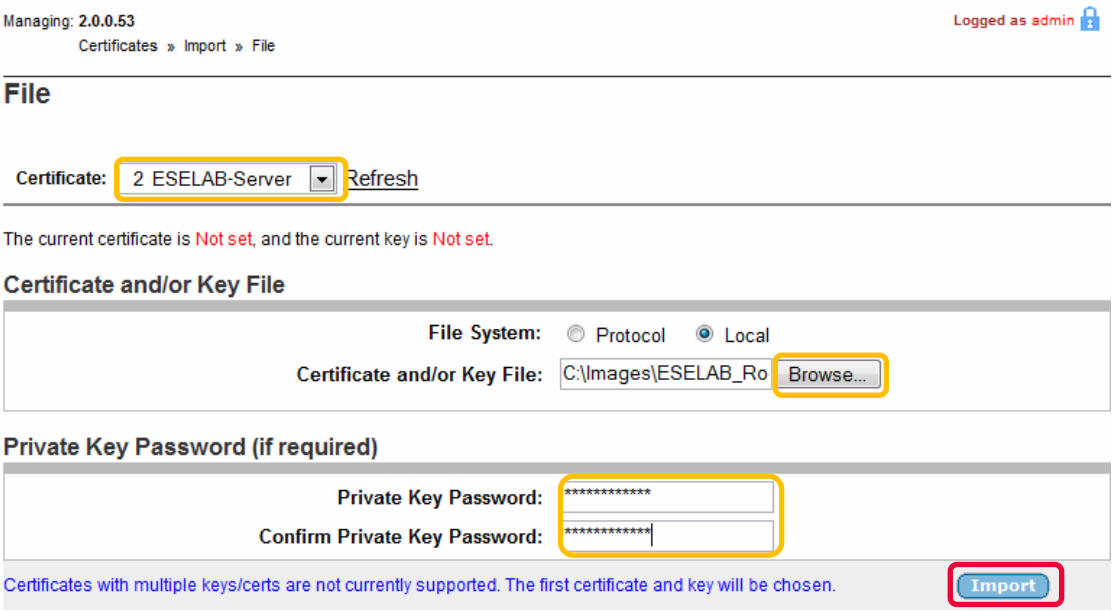
2 Specify a unique name for the server certificate and then click *Update*.



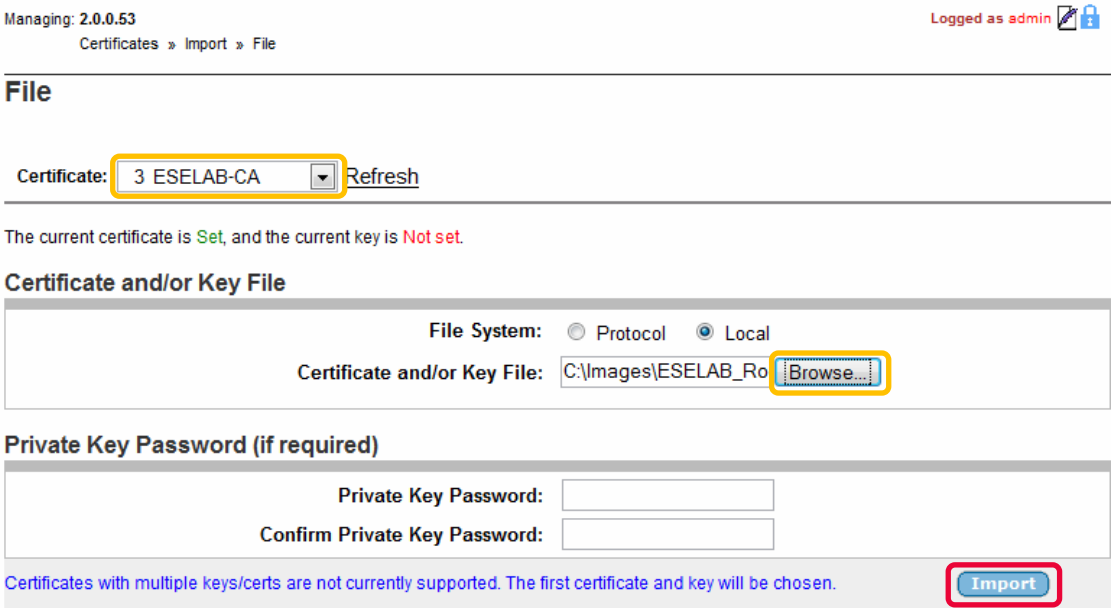
3 Click *Add* and specify unique a name for the CA root certificate and then click *Update*.



4 Using the navigation tree click *Certificates*, *Import* and then *File*. In the *Certificate* pull-down menu select the server certificate name created in step 2. Click Browse and locate the PKCS#12 server certificate issued from the Certificate Authority. Enter and verify the *Private Key Password* then click *Import*.



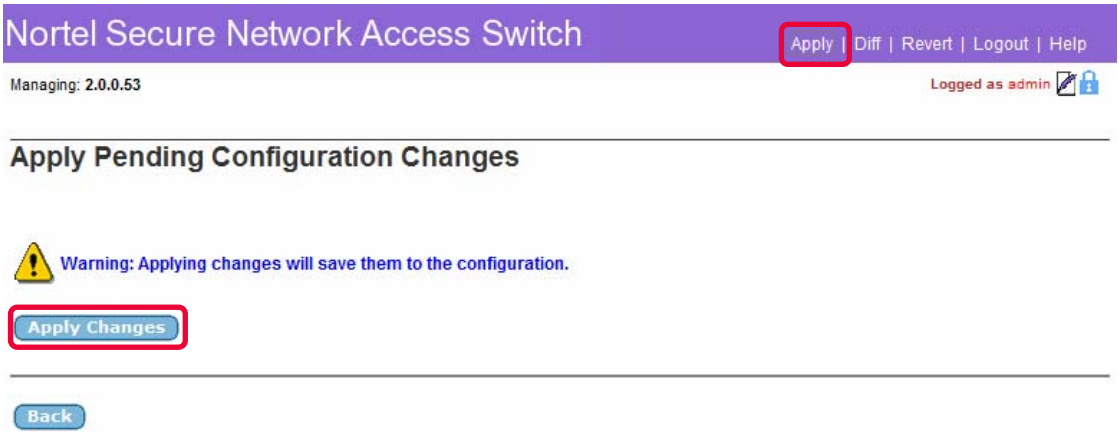
5 **Using the navigation tree click *Certificates*, *Import* and then *File*. In the *Certificate* pull-down menu select the CA root certificate name created in step 3. Click Browse and locate the CA certificate issued from the Certificate Authority then click *Import*. Note that the CA root certificate does not require a *Private Key Password*.**



6 **The server and CA root certificates will now be installed on the Secure Network Access Switch.**

ID	Name	Cert	CA Cert	Key	Key Size	Key Match
1	test_cert	Yes	Yes	Yes	1024	Yes
2	ESELAB-Server	Yes	No	Yes	1024	Yes
3	ESELAB-CA	Yes	Yes	No		

10 Apply and save the changes by clicking *Apply* and then *Apply Changes*.



2.1.3 Local Authentication:

This section provides details on how to configure the Secure Network Access Switch to authenticate RADIUS access requests against the local database.

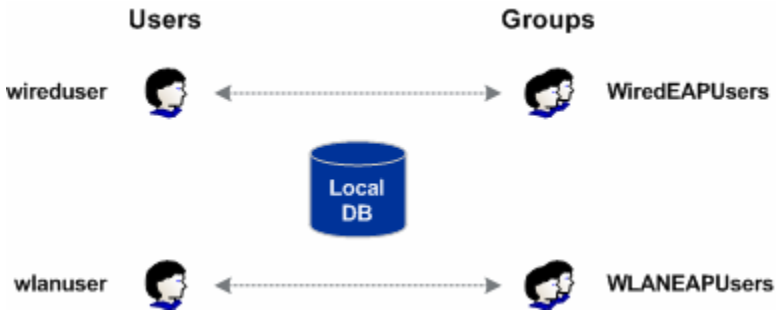


Figure 2.1.3 – Local User Database

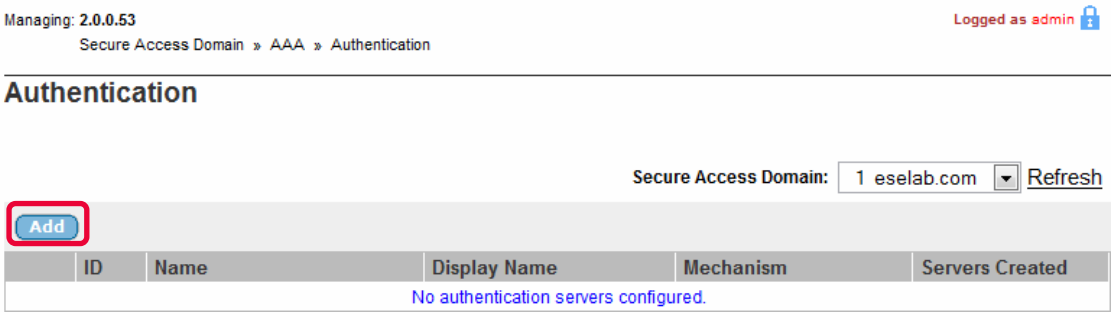
2.1.3.1 Authentication Servers:

A local authentication server will need to be created on the Secure Network Access Switch to authenticate RADIUS access requests from the Nortel Ethernet Switch or Nortel WLAN 2300 Controller against the local user database:

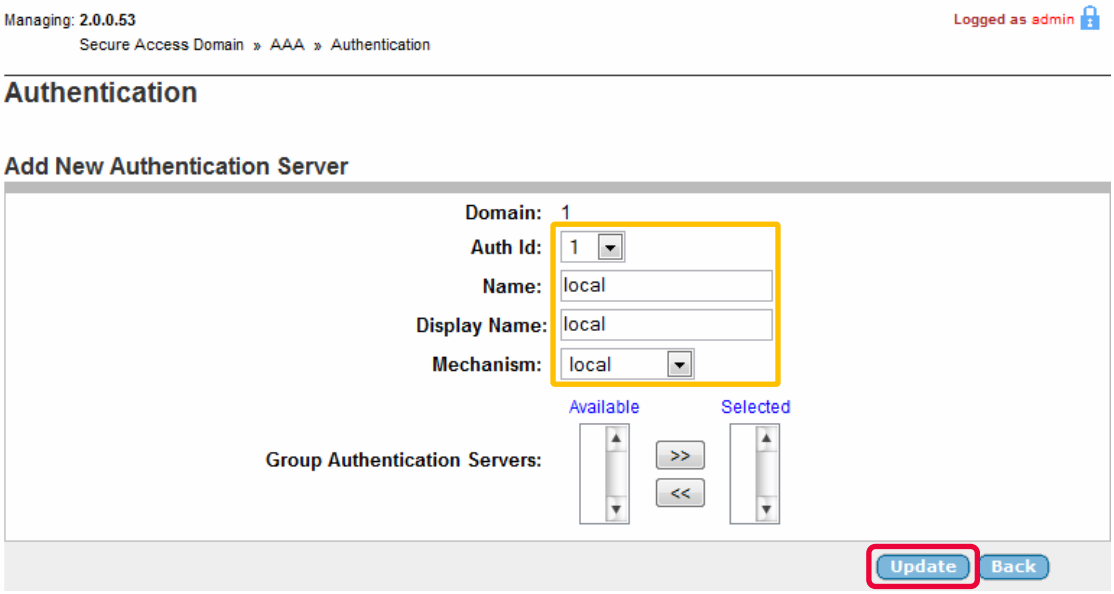
- A local authentication server will be created
- The local authentication server will be added to the authentication order

Local authentication can be enabled and authentication order defined on the Secure Network Access Switch using the Browser Based Interface with the following steps:

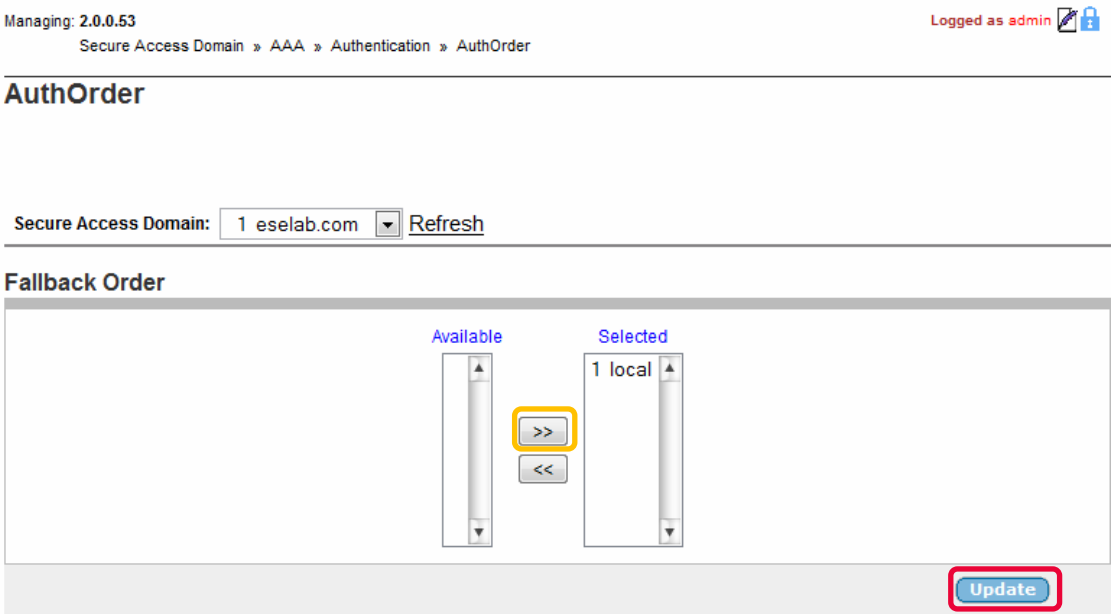
1 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication* and then *Add*.**



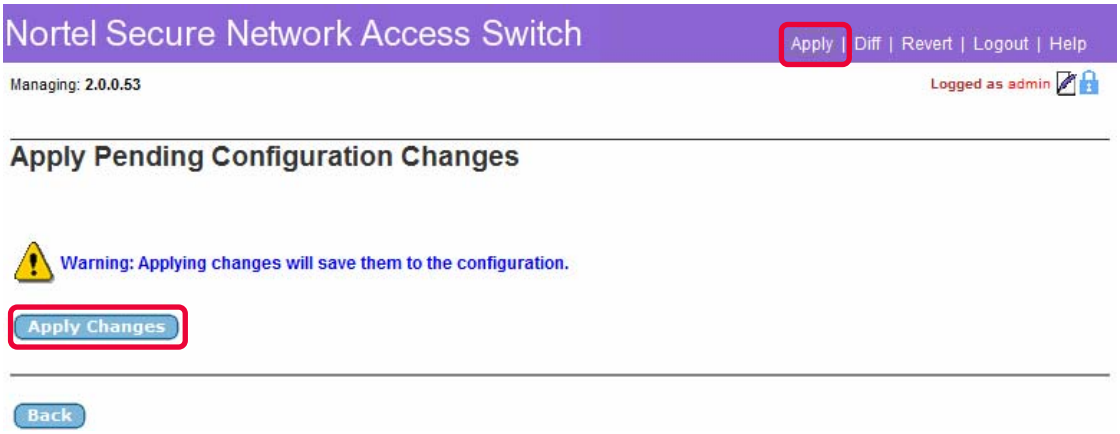
2 **Specify a Local Server *Name*, *Display Name* and set the Mechanism to *local*. Click *Update*.**



3 **In the navigation tree click *Secure Access Domain*, *AAA*, *Authentication* and *AuthOrder*. In the *Available* list highlight the name of the local authentication server and click *move*. Click *Update*.**



4 Apply and save the changes by clicking *Apply* and then *Apply Changes*.



2.1.3.2 AAA Groups:

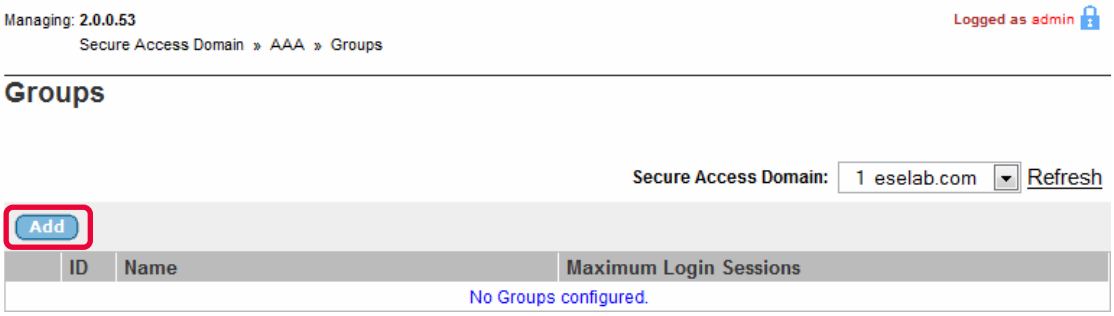
Two groups will be defined on the Secure Network Access Switch which will be used to separate Wired and Wireless LAN users and determine VLAN membership upon successful authentication. Separate groups are required as the Nortel Ethernet Switch and Nortel WLAN 2300 Controllers require different RADIUS Return Attributes to determine VLAN membership:

- WiredEAPUsers – Authenticated Wired users will be placed into VLAN Id 40.

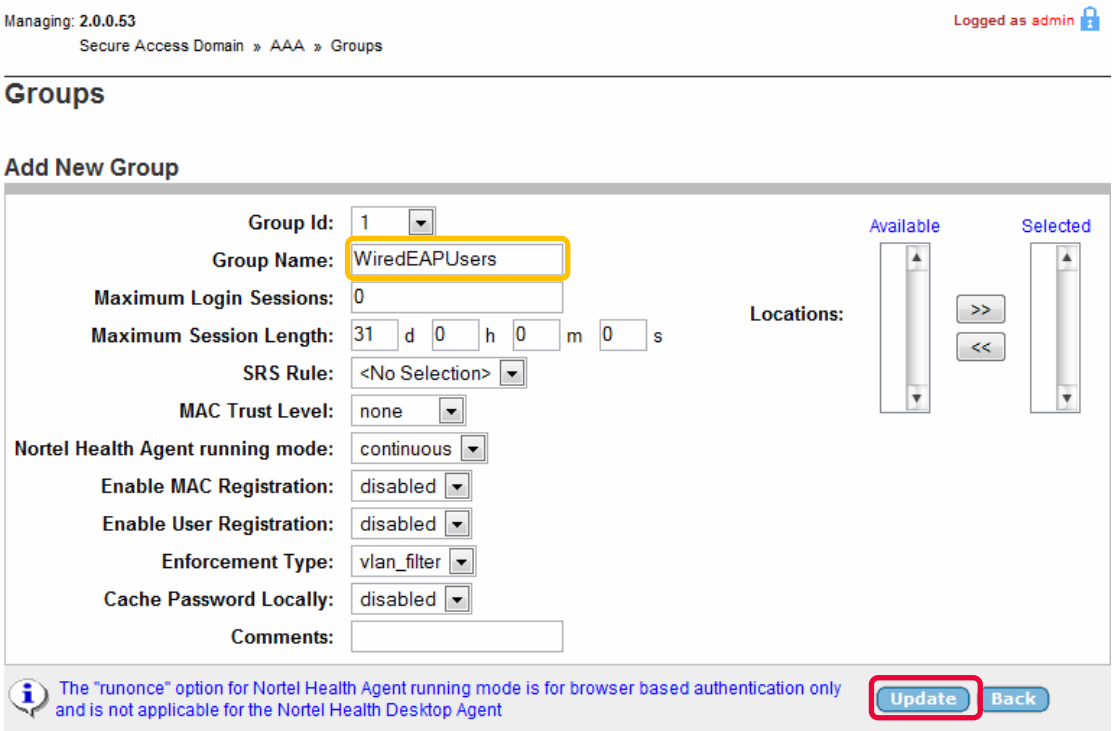
- WlanEAPUsers – Authenticated Wireless users will be placed into VLAN Named USERS1.

Groups can be defined on the Secure Network Access Switch using the Browser Based Interface with the following steps:

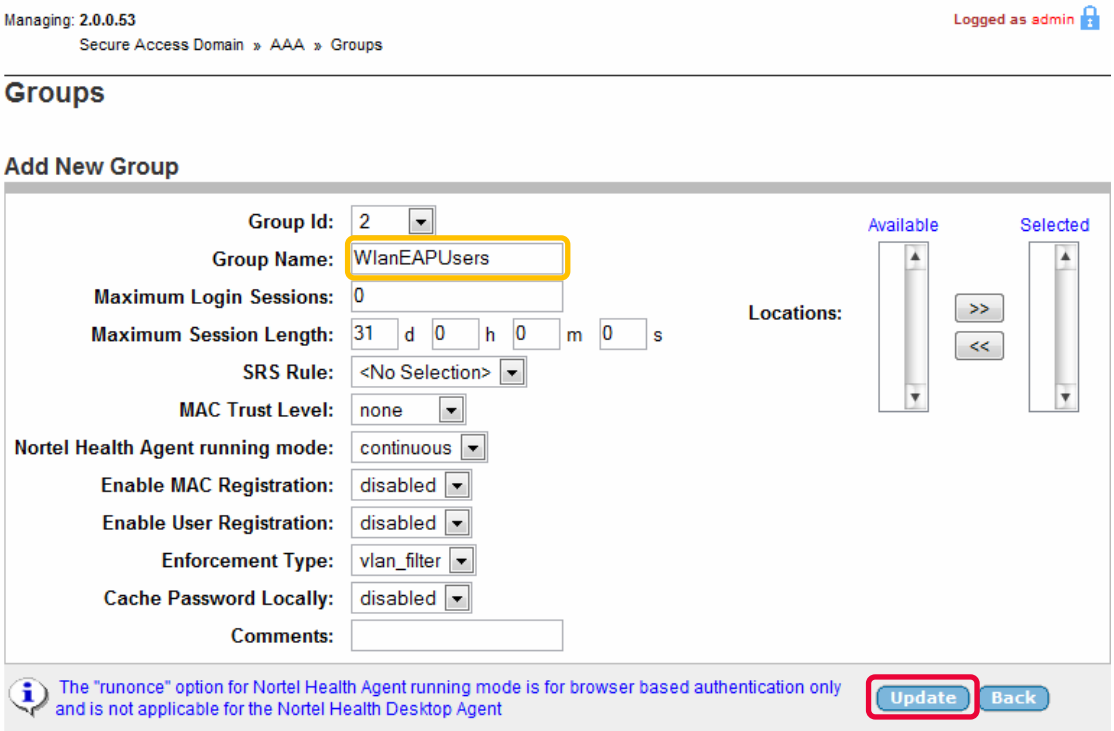
1 Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Groups* and then *Add*.



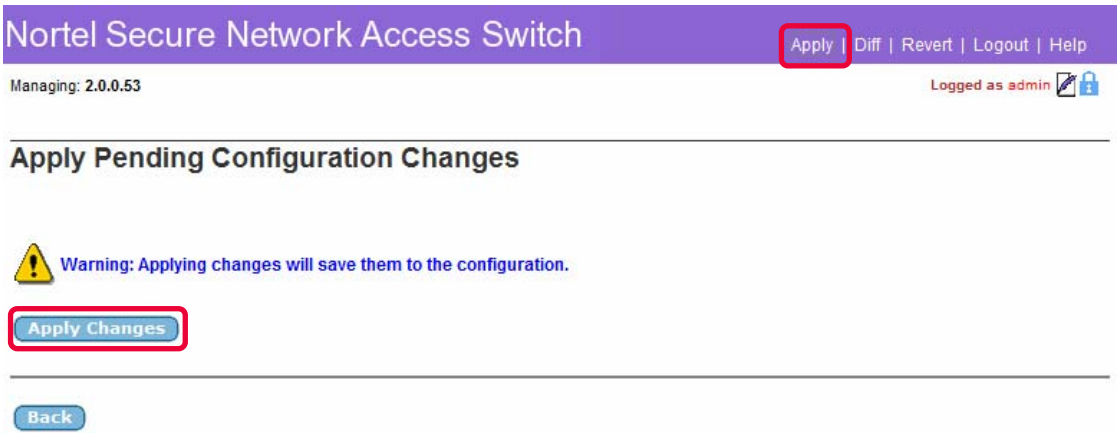
2 In the *Group Name* field enter the name *WiredEAPUsers* and then click *Update*.



3 In the *Group Name* field enter the name *WlanEAPUsers* and then click *Update*.



4 Apply and save the changes by clicking *Apply* and then *Apply Changes*.



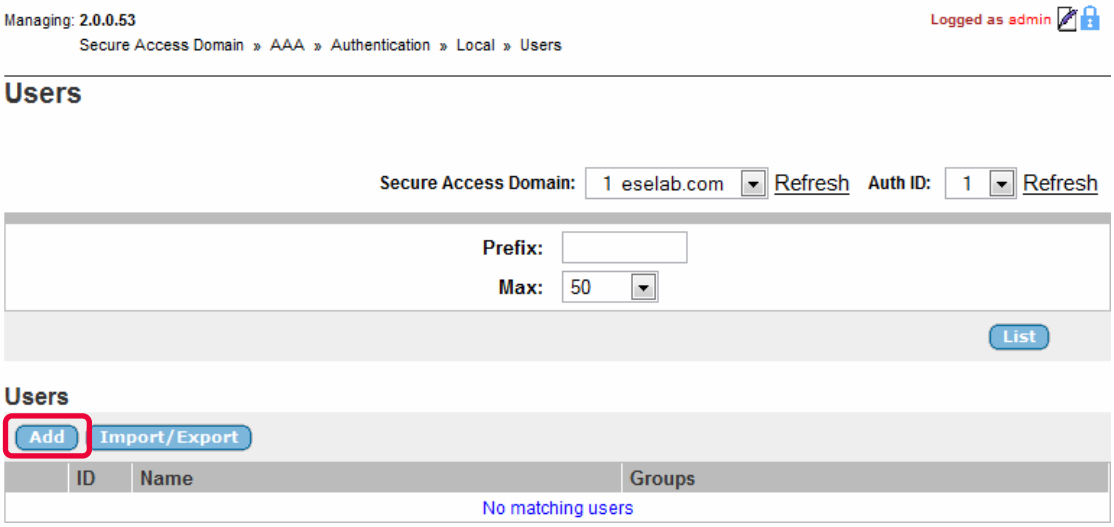
2.1.3.3 Local Users:

Two local users will be created Secure Network Access Switch and assigned to the groups created in Section 2.1.3.2:

Username	Group
wireduser	WiredEAPUsers
wlanuser	WlanEAPUsers

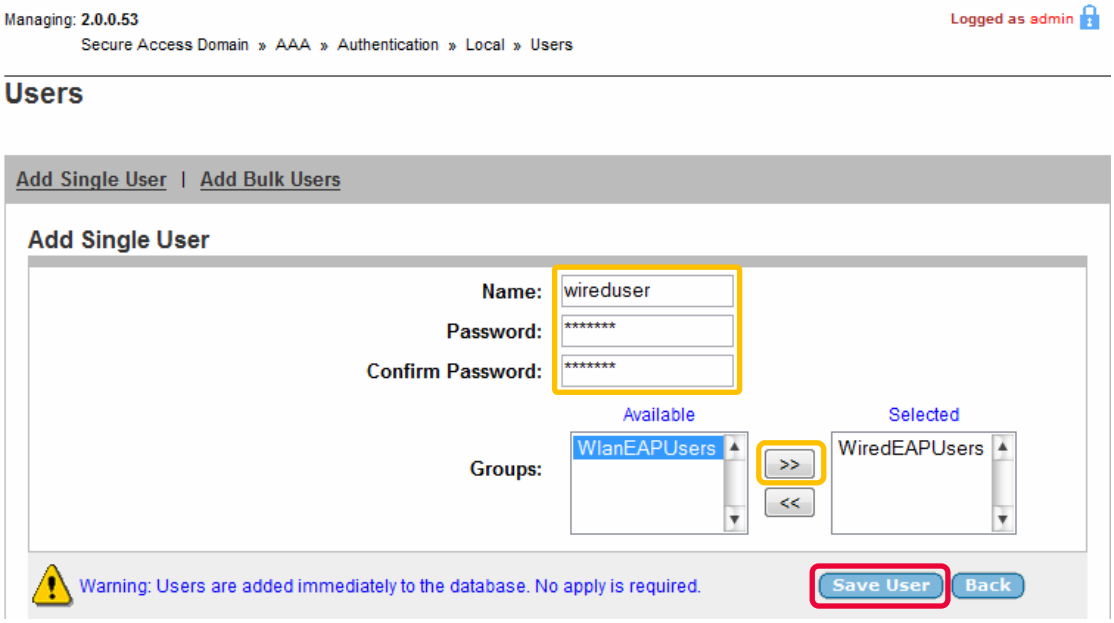
Local users can be created on the Secure Network Access Switch using the Browser Based Interface with the following steps:

1 Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Groups*, *Authentication*, *Local*, *Users* then *Add*.

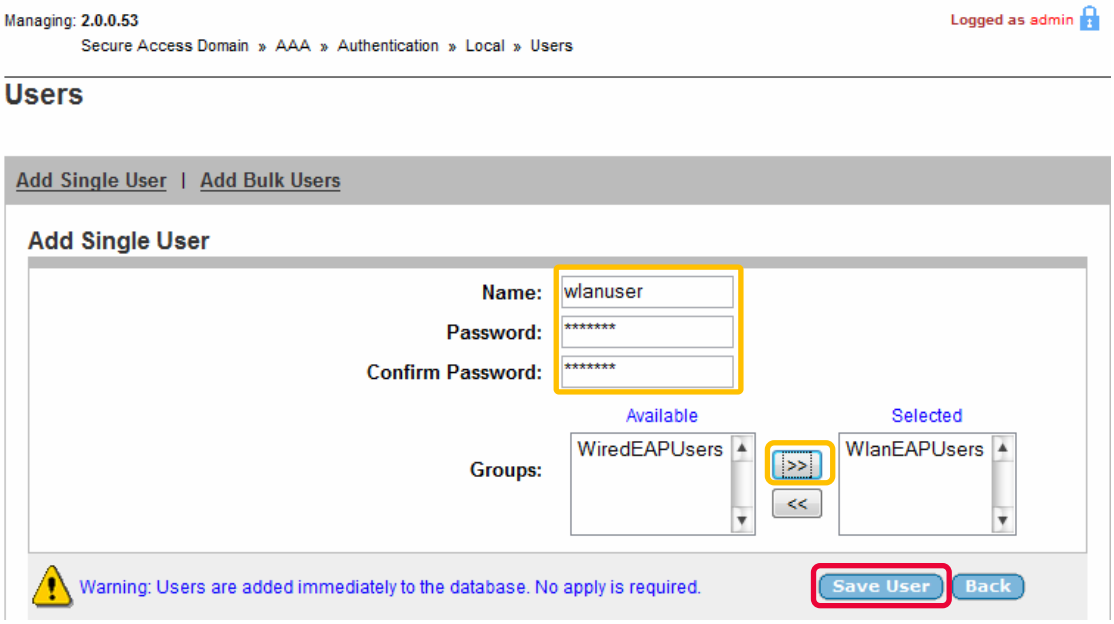


2 In the *Name* field enter the name *wireduser* and specify a password. In the Available

Groups list highlight the group *WiredEAPUsers* and then click *Move*. Click *Save User*.



3 **In the *Name* field enter the name *wlanuser* and specify a password. In the Available Groups list highlight the group *WlanEAPUsers* and then click *Move*. Click *Save User*.**



2.1.4 Active Directory Authentication:

This section provides details on how to configure the Secure Network Access Switch to authenticate RADIUS access requests against Active Directory using NTLM for user authentication and LDAP for group association.

2.1.4.1 Authentication Servers:

LDAP and NTLM authentication servers will be created on the Secure Network Access Switch to authenticate RADIUS access requests against Microsoft Active Directory:

- A LDAP authentication server entry will be created which will be used for Active Directory group association.
- A NTLM authentication server entry will be created which will be used for Active Directory user authentication.
- The NTLM authentication server will be added to the authentication order.

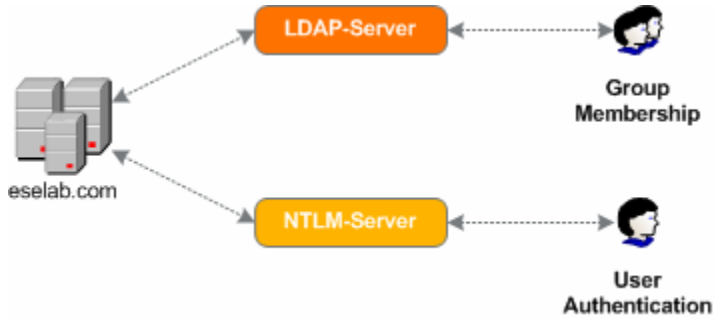
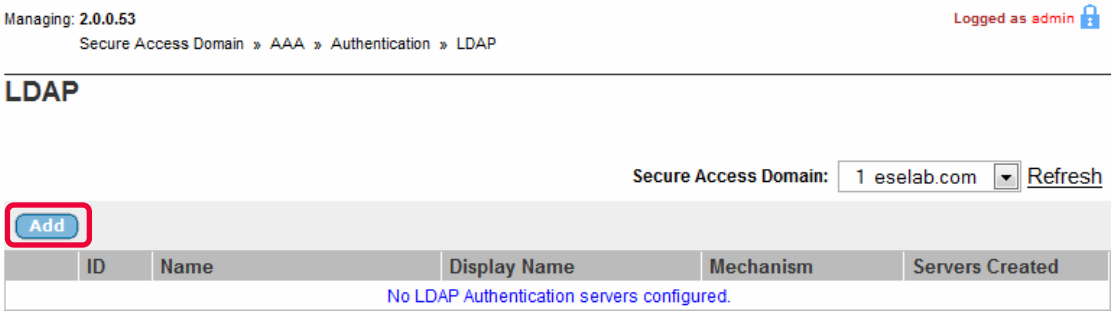


Figure 2.1.4.1 – LDAP and NTLM Servers

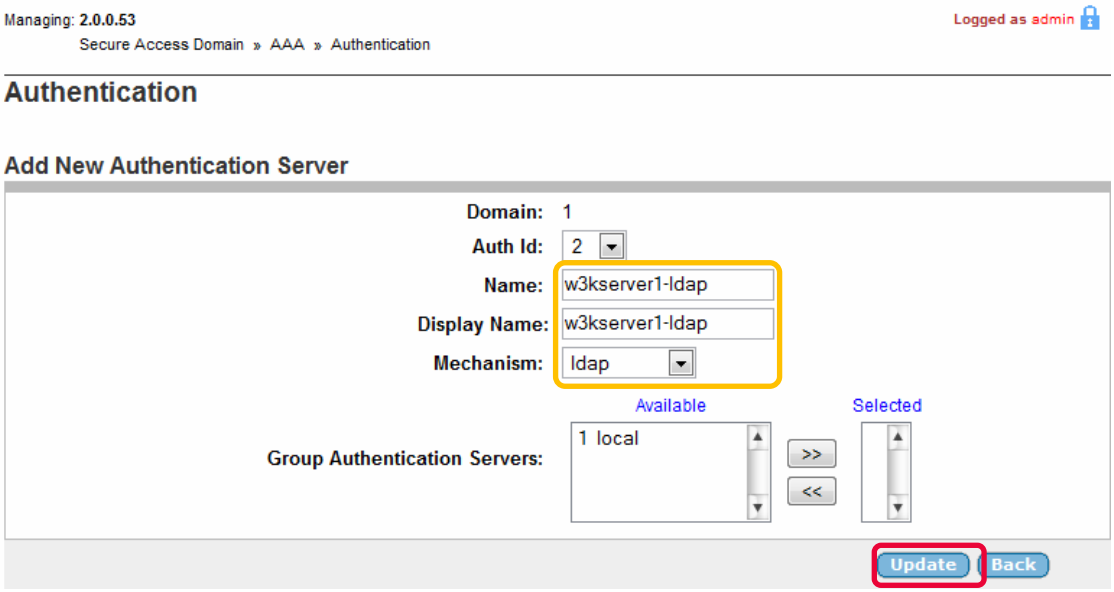
This section assumes that NTLMv1 is enabled on the Domain Controller. Details for enabling NTLMv1 authentication are provided by the following Microsoft Knowledge Base Article: http://support.microsoft.com/kb/942564.

LDAP and NTLM authentication servers can be created and the authentication order defined on the Secure Network Access Switch using the Browser Based Interface with the following steps:

1 Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *LDAP* and then *Add*.

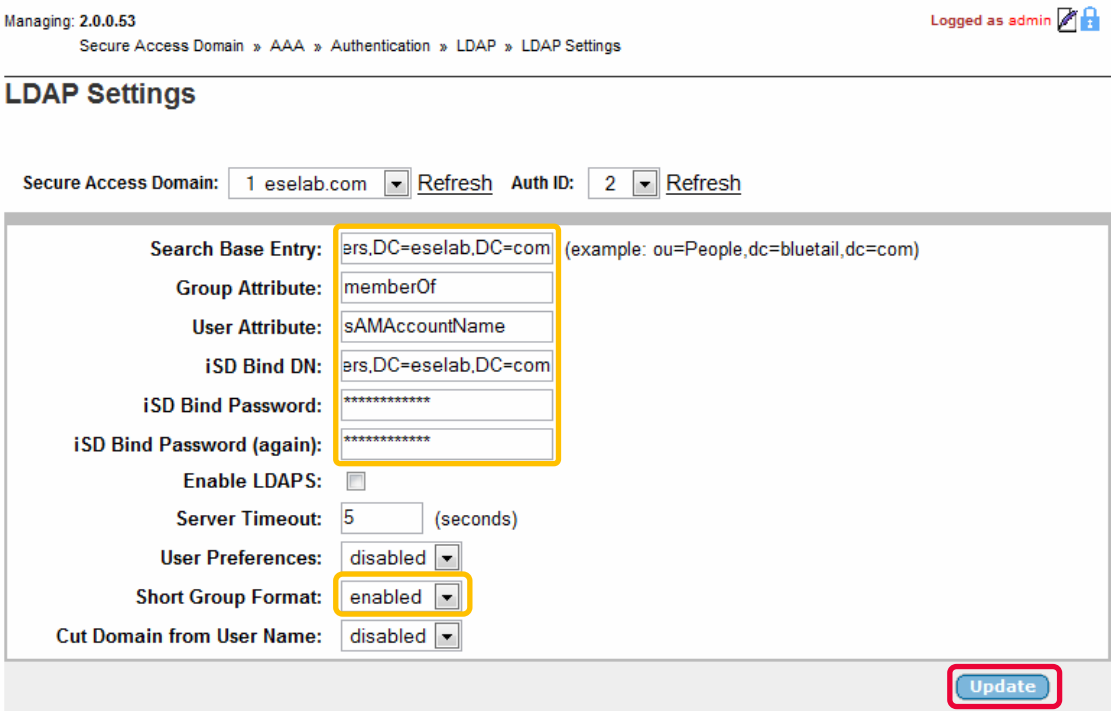


2 Specify a LDAP Server *Name*, *Display Name* and set the Mechanism to *LDAP* Click *Update*.

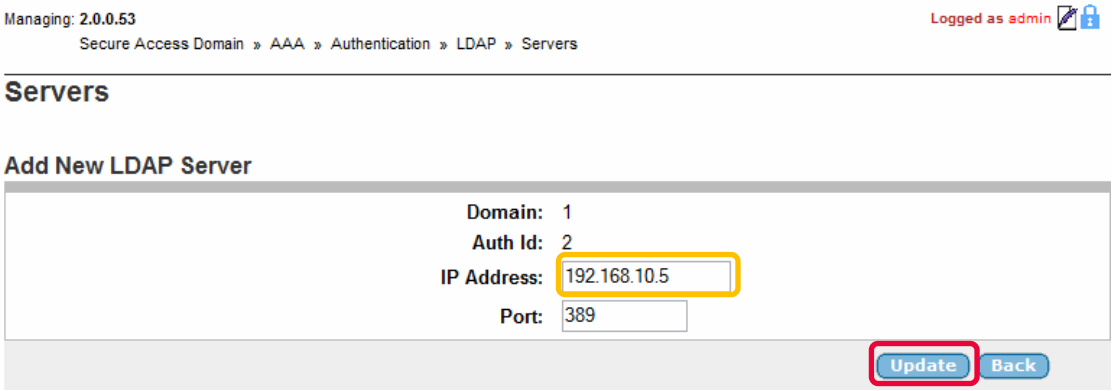


3 Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *LDAP* and then *LDAP Settings*. Enter the following required information then click *Update*.

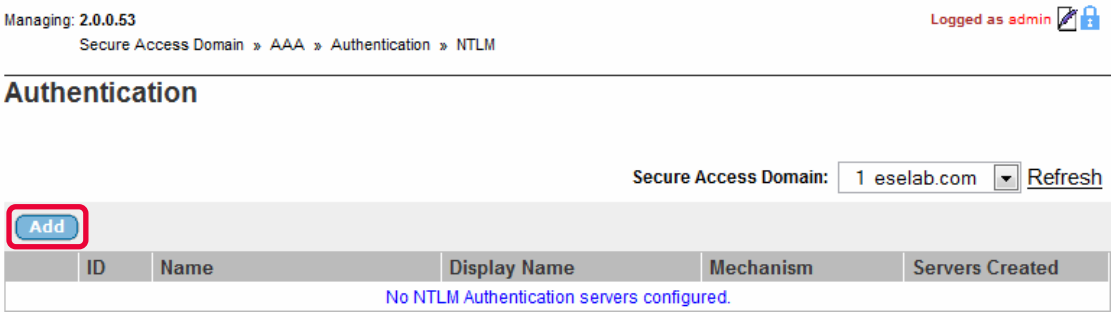
Search Base Entry	Assigns the DN (Distinguished Name) of the Active Directory container where the user entries are found. In this example the following DN was used: *CN=Users,DC=eselab,DC=com*. Note: To support both computer and user authentication for the eselab.com domain the searchbase *DC=eselab,DC=com* should be used.
Group Attribute	Defines the LDAP attribute that contains the name(s) of the group(s) of which a particular user is a member. For Active Directory this value needs to be set to: *memberOf*.
User Attribute	Defines the LDAP attribute that contains the user names used for authentication of a user in the domain. For Active Directory this value needs to be set to: *sAMAccountName*.
iSD Bind DN	Points to an entry in the Active Directory server used for authenticating the Nortel Secure Network Access Switch. In this example a user named 'nsnas' was created in Active Directory which requires the following DN to be used: *CN=nsnas,CN=Users,DC=eselab,DC=com*.
iSD Bind Password	Defines the password assigned to the Active Directory user defined by the iSD Bind DN.
Short Group Format	Specify if the short group format should be enabled or not. This value needs to be set to: *Enabled*.



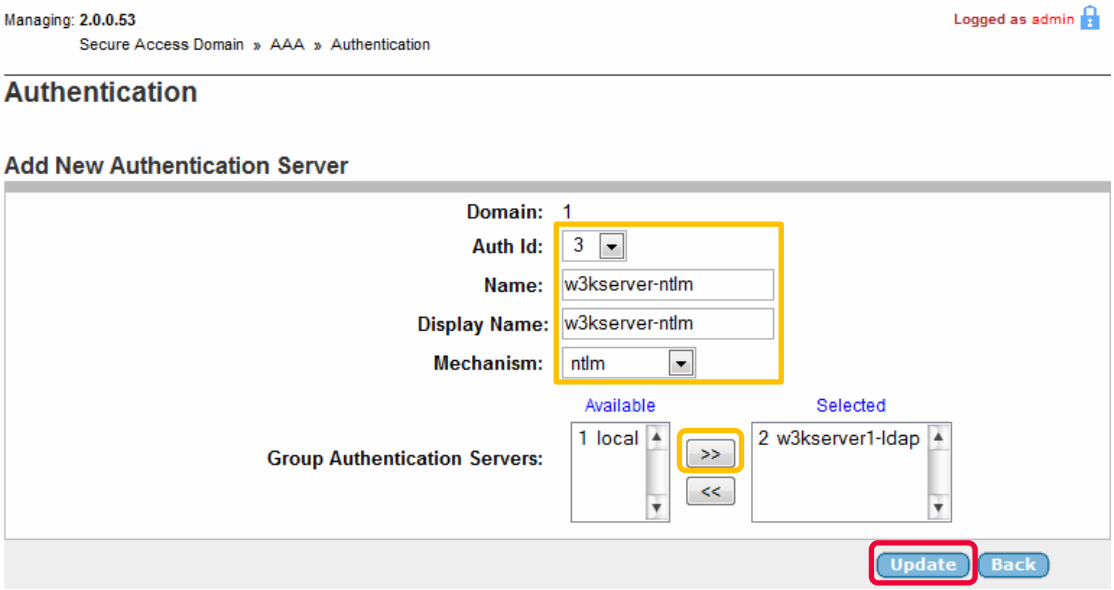
4 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *LDAP* and then *Servers*. Specify the Active Directory Servers *IP Address* and click *Update*.**



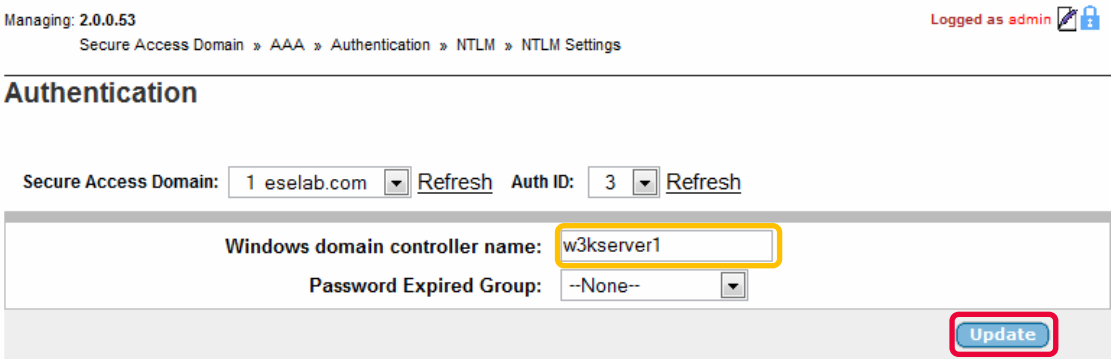
5 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *NTLM* and then *Add*.**



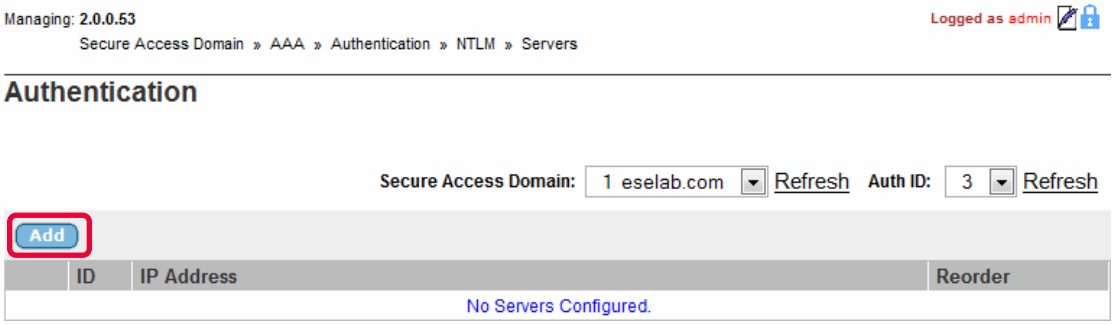
6 **Specify a NTLM Server *Name*, *Display Name* and set the Mechanism to *NTLM*. In the *Available* list highlight the LDAP server name created in step 2 and click *Move*. Click *Update*.**



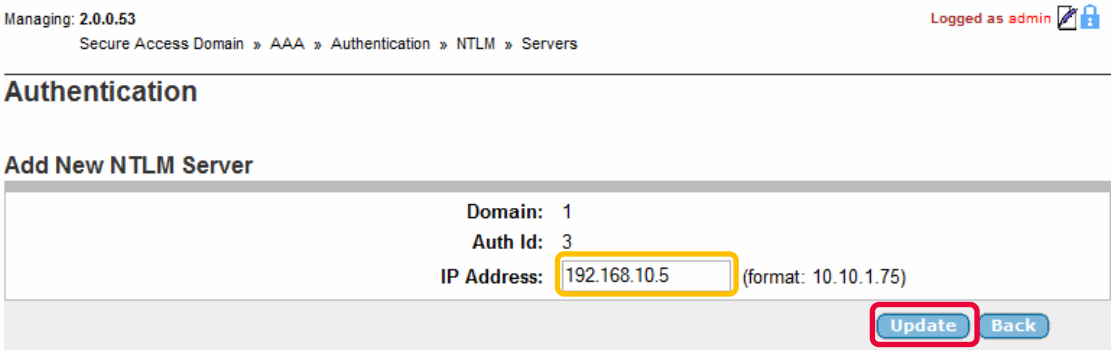
7 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *NTLM*, *NTLM Settings*. Specify the hostname of the Windows Domain Controller then click *Update*.**



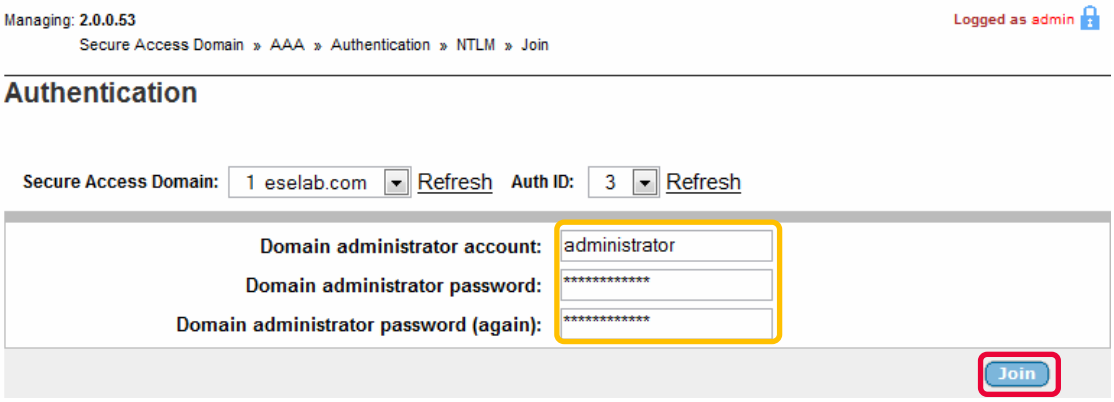
8 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *NTLM*, *Servers* and click *Add*.**



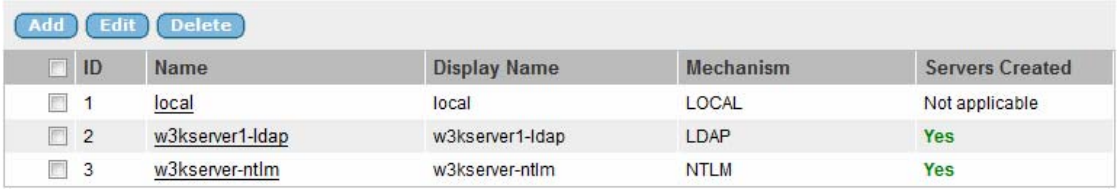
9 **Specify the IP Address of the Domain Controller and click *Update*.**



10 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Authentication*, *NTLM* and then *Join.* Specify the Domain Administrator username and password and click *Join*.**



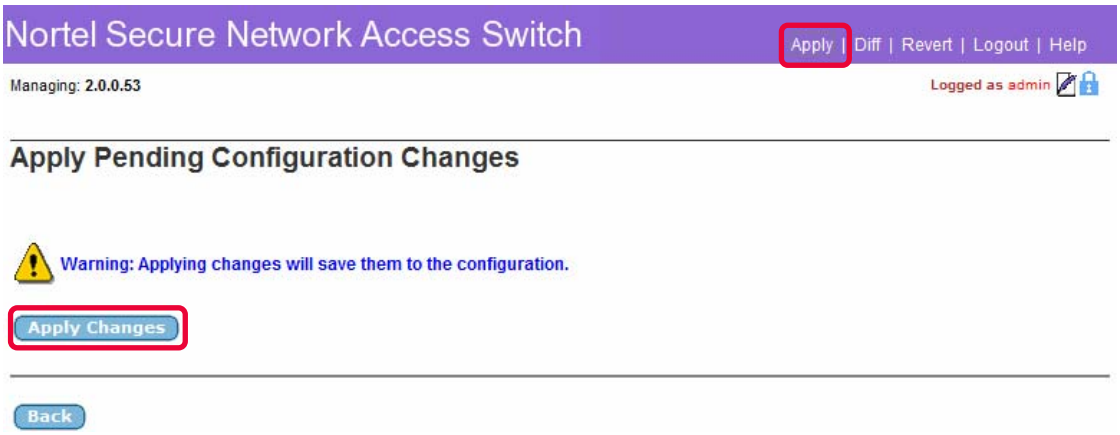
11 **The LDAP and NTLM servers will now be installed on the Secure Network Access Switch.**



ID	Name	Display Name	Mechanism	Servers Created
1	local	local	LOCAL	Not applicable
2	w3kserver1-ldap	w3kserver1-ldap	LDAP	Yes
3	w3kserver-ntlm	w3kserver-ntlm	NTLM	Yes

12 **In the navigation tree click *Secure Access Domain*, *AAA*, *Authentication* and *AuthOrder.* In the *Available* list highlight the name of the NLTM authentication server click *move* and then *Update*.**

13 Apply and save the changes by clicking *Apply* and then *Apply Changes*.



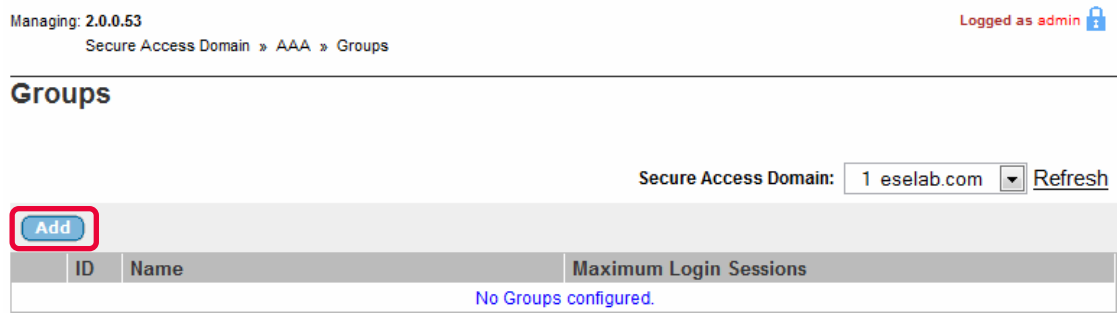
2.1.4.2 AAA Groups:

Two groups will be defined on the Secure Network Access Switch which will be used to separate Wired and Wireless LAN users and determine VLAN membership upon successful authentication. Separate groups are required as the Nortel Ethernet Switch and Nortel WLAN 2300 Controllers require different RADIUS Return Attributes to determine VLAN membership:

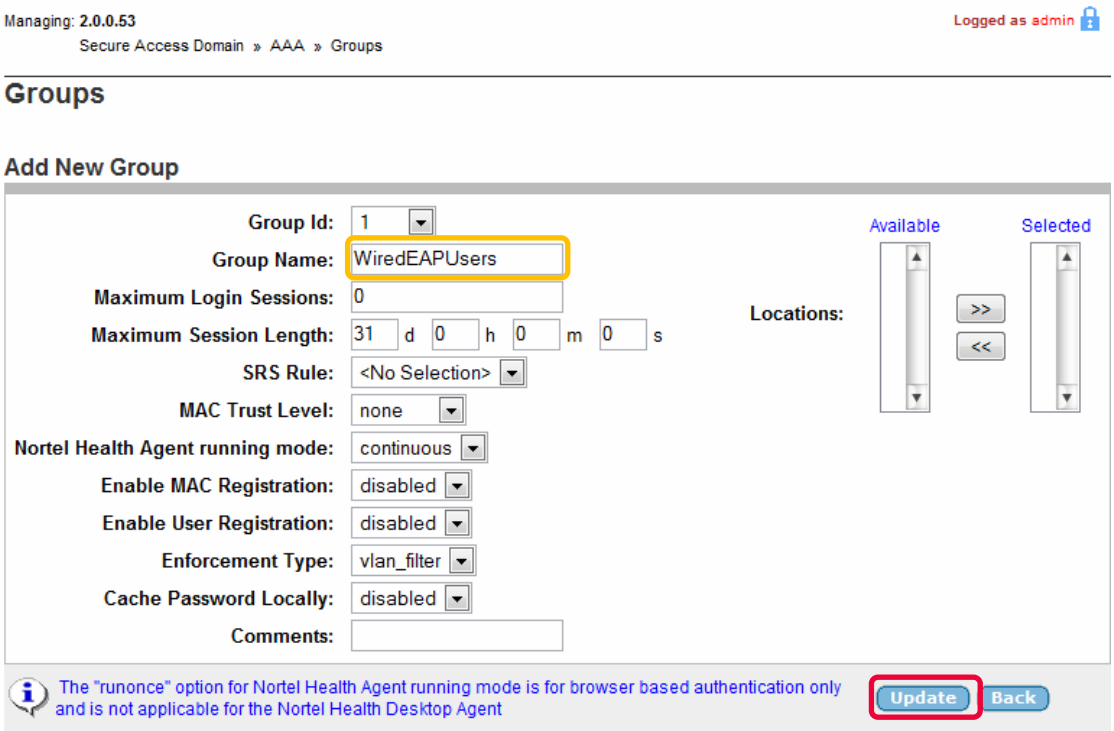
- WiredEAPUsers – Authenticated Wired users will be placed into VLAN Id 40.
- WlanEAPUsers – Authenticated Wireless users will be placed into VLAN Named USERS1.

Groups can be defined on the Secure Network Access Switch using the Browser Based Interface with the following steps:

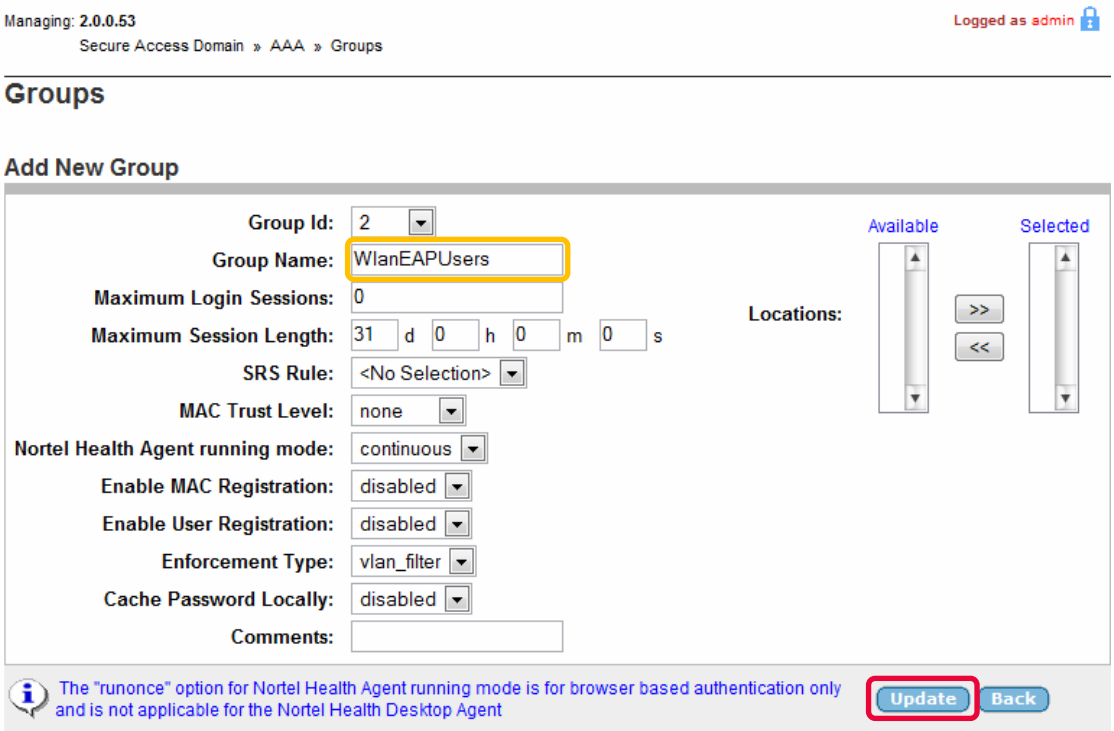
1 Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Groups* and then *Add*.



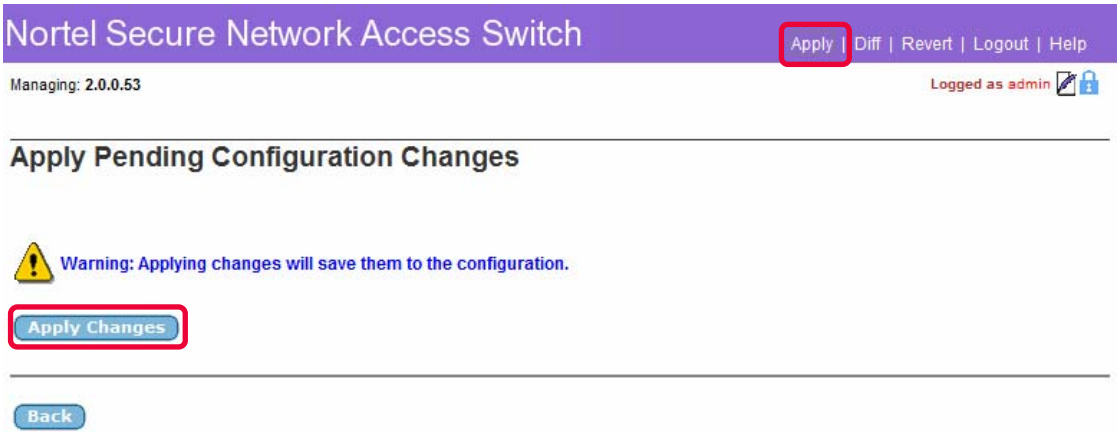
2 In the *Group Name* field enter the name *WiredEAPUsers* and then click *Update*.



3 In the *Group Name* field enter the name *WlanEAPUsers* and then click *Update*.



4 Apply and save the changes by clicking *Apply* and then *Apply Changes*.



2.1.5 RADIUS Server:

The RADIUS server needs to be configured to allow the Secure Network Access Switch to support RADIUS access requests from the Nortel Ethernet Switch and Nortel WLAN 2300 Controller:

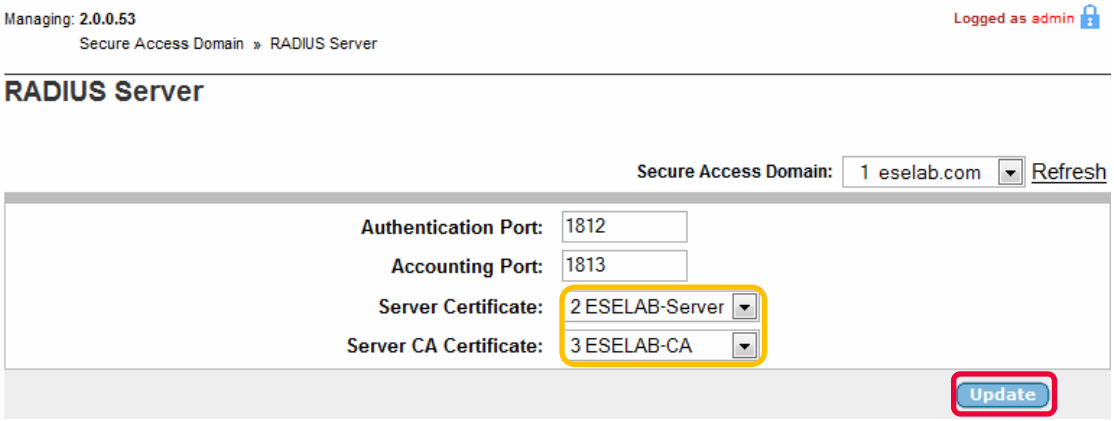
1. Certificates – The Server and Root CA Certificates created in Section 2.1.2 will be selected for use with EAP-TLS and PEAP authentication.

- Clients – The Ethernet Routing Switch 5500 and WLAN 2300 Controller will be defined as RADIUS clients.

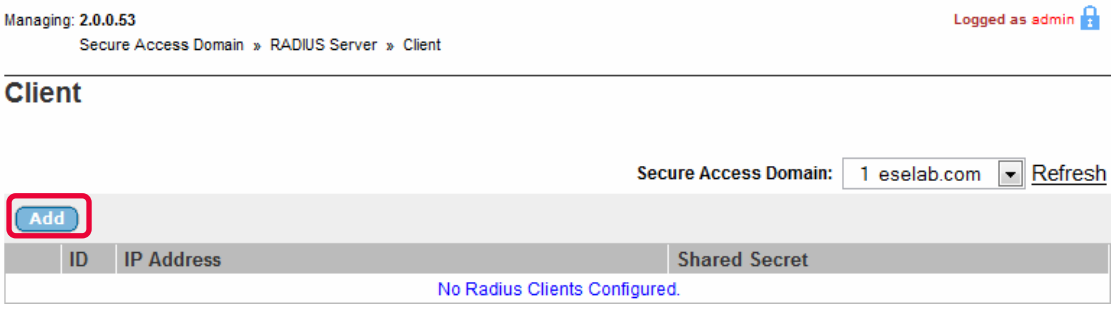
- Realms – A realm will be defined to direct authentication requests to the Secure Network Access Switch local authentication server.

RADIUS Server configuration can be defined on the Secure Network Access Switch using the Browser Based Interface with the following steps:

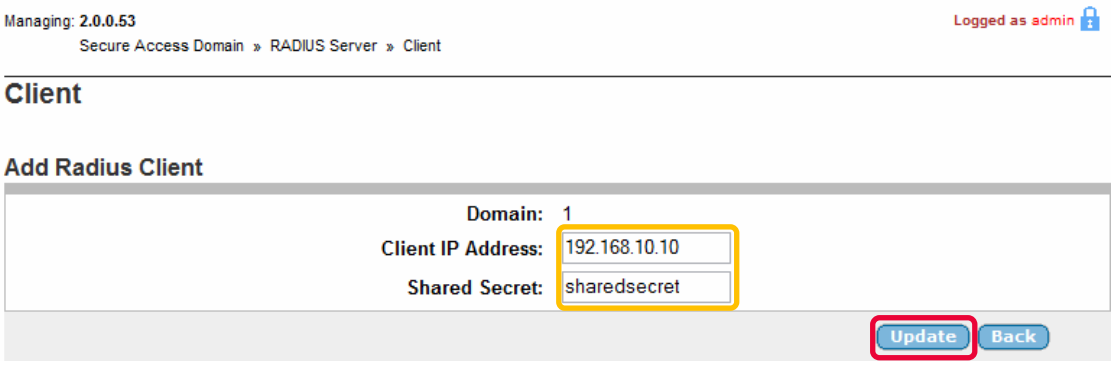
1 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain* then *RADIUS Server*. In the *Server Certificate* and *Server CA Certificate* pull-down menus select the certificate added in section 2.1.2. Click *Update*.**



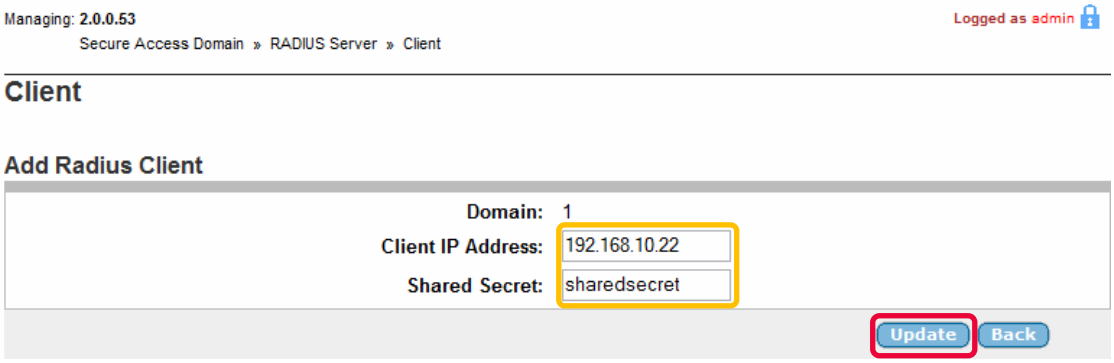
2 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *RADIUS Server* then *Client*. Click *Add.***



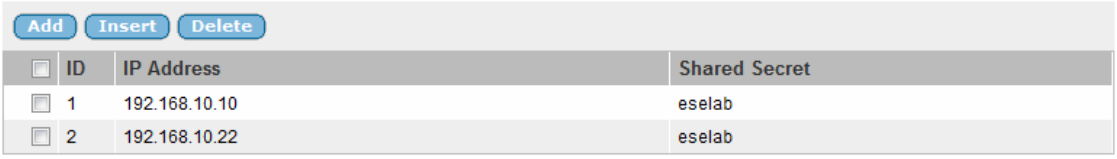
3 **Enter the *IP Address* and *Shared Secret* of the Ethernet Routing Switch 5500. Click *Update*.**



5 **Enter the *IP Address* and *Shared Secret* of the WLAN 2300 Controller. Click *Update*.**

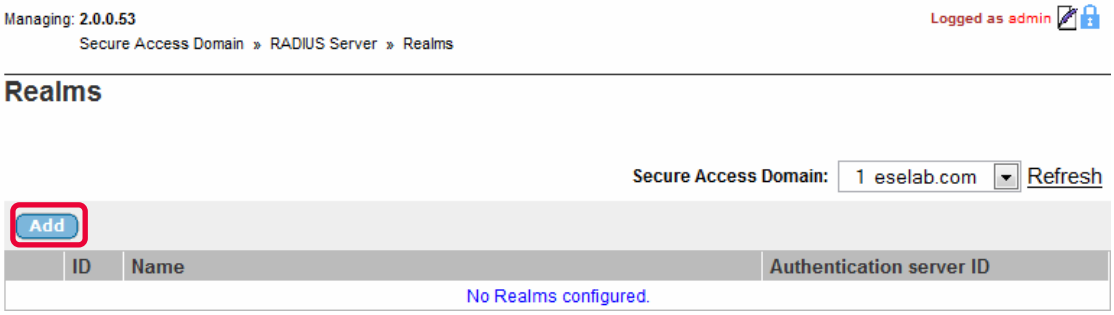


6 **RADIUS client entries for the Ethernet Switch and WLAN 2300 Controllers will now be created.**

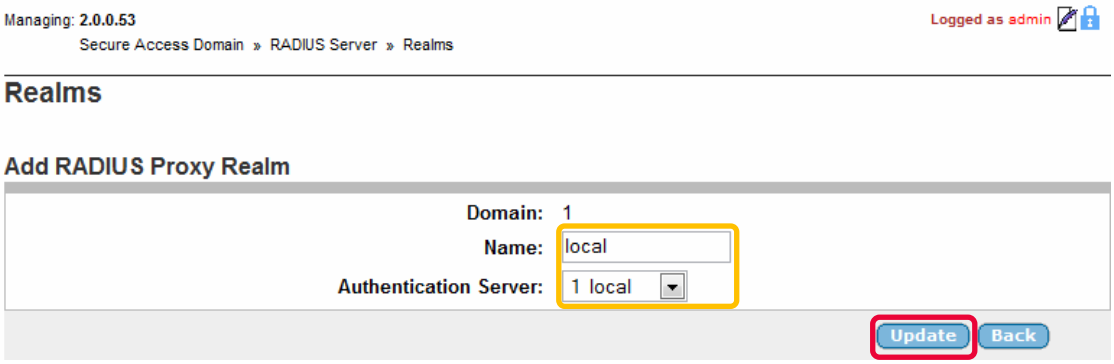


The Shared Secret defined on the Secure Network Access Switch for the RADIUS Client must match the Shared Secret defined on the RADIUS Server configuration on the client or authentication will fail.

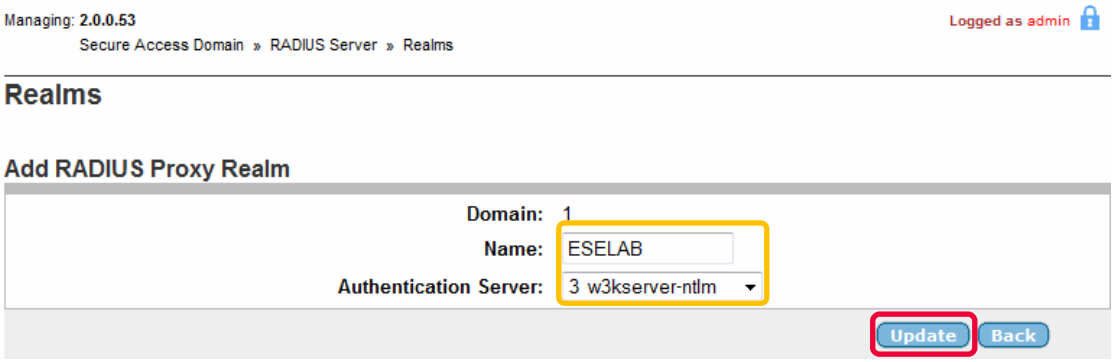
7 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *RADIUS Server* then *Realms*. Click *Add.***



8 **Local Authentication – In the Name field type *local*. In the *Authentication Server* pull-down menu select the name of the local authentication server created in section 2.1.3.1 then click *Update*.**

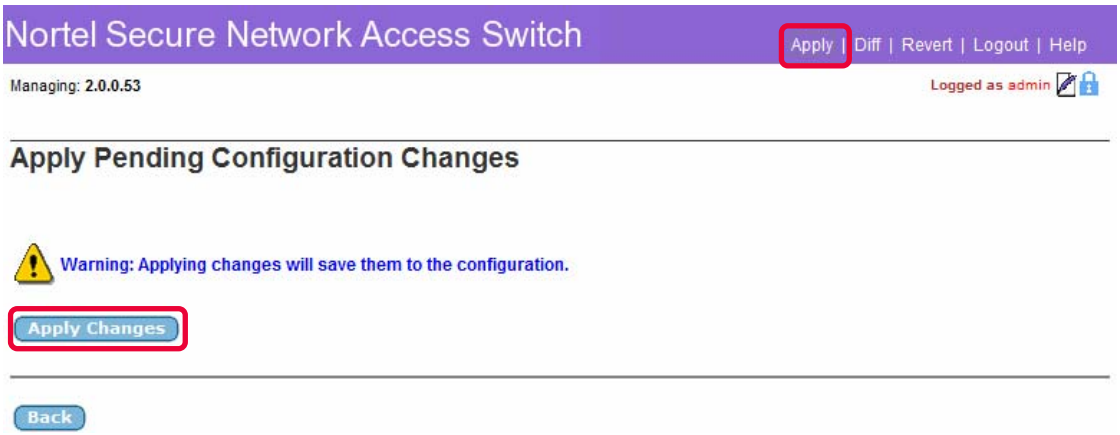


9 **Active Directory Authentication – In the Name field type enter the name of the Active Directory Domain *ESELAB*. In the *Authentication Server* pull-down menu select the name of the NTLM authentication server created in section 2.1.4.1 then click *Update*.**



Additional details on Realms may be located in the Appendix in Section 5.

10 **Apply and save the changes by clicking *Apply* and then *Apply Changes*.**



2.1.6 RADIUS Attributes:

RADIUS return attributes will be assigned to the Wired and WLAN User groups to determine VLAN membership upon successful client authentication:

Attribute Name	Vendor-ID	Attribute-ID	Attribute-Value
Tunnel-Type	0	64	13
Tunnel-Medium-Type	0	65	6
Tunnel-Private-Group-ID	0	81	40

Table 2.1.6.1 – WlanEAPUsers Return Attributes

Attribute Name	Vendor-ID	Attribute-ID	Attribute-Value
VLAN-Name	562	231	USERS1

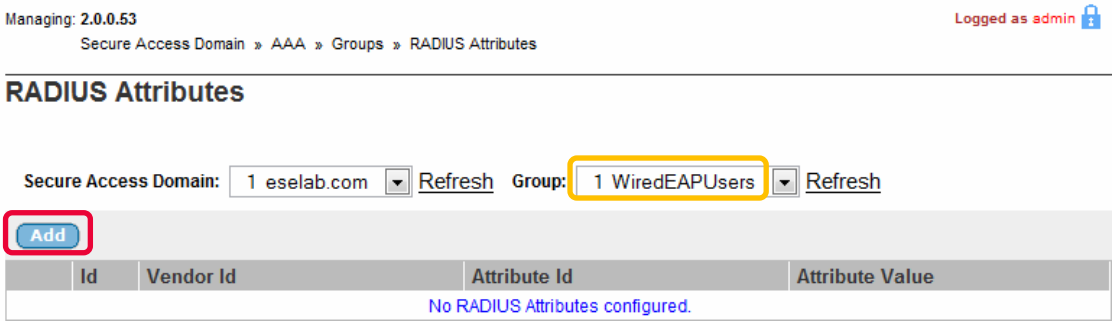
Table 2.1.6.2 – WlanEAPUsers Return Attributes

A full list of supported attributes for the Nortel Ethernet Switch and Nortel WLAN 2300 Controllers is provided in the Appendix.

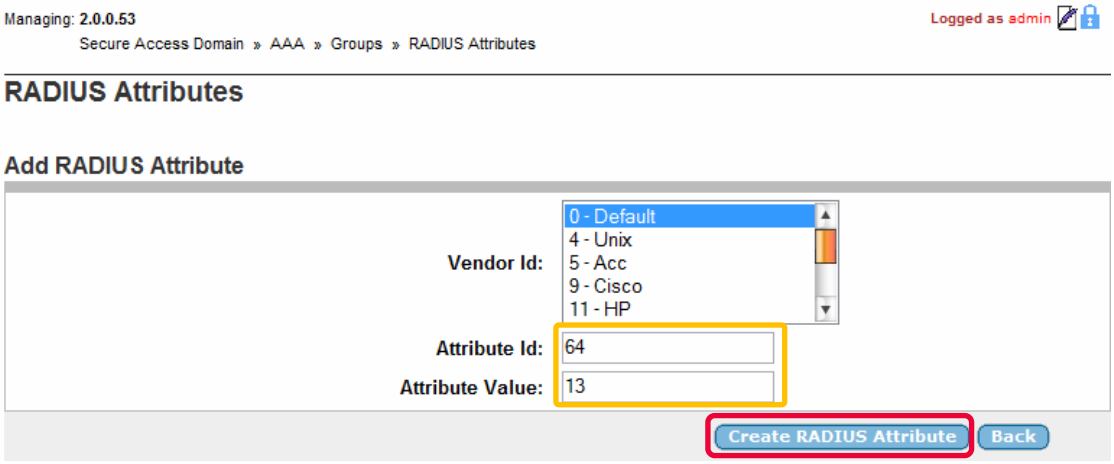
RADIUS Attributes can be defined on the Secure Network Access Switch using the Browser Based Interface with the following steps:

1 Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Groups* then *RADIUS Attributes*. In the *Group* pull-down menu select the group

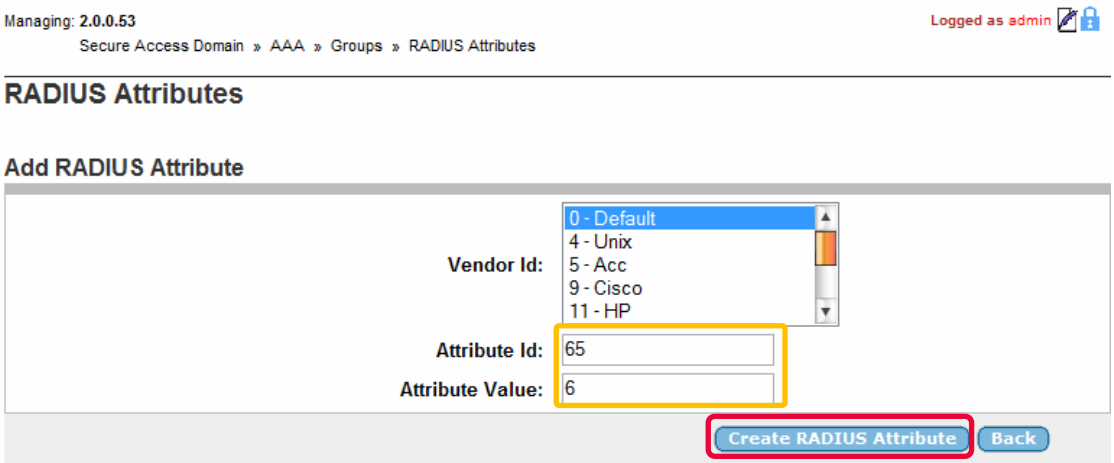
***WiredEAPUsers* and click *Add*.**



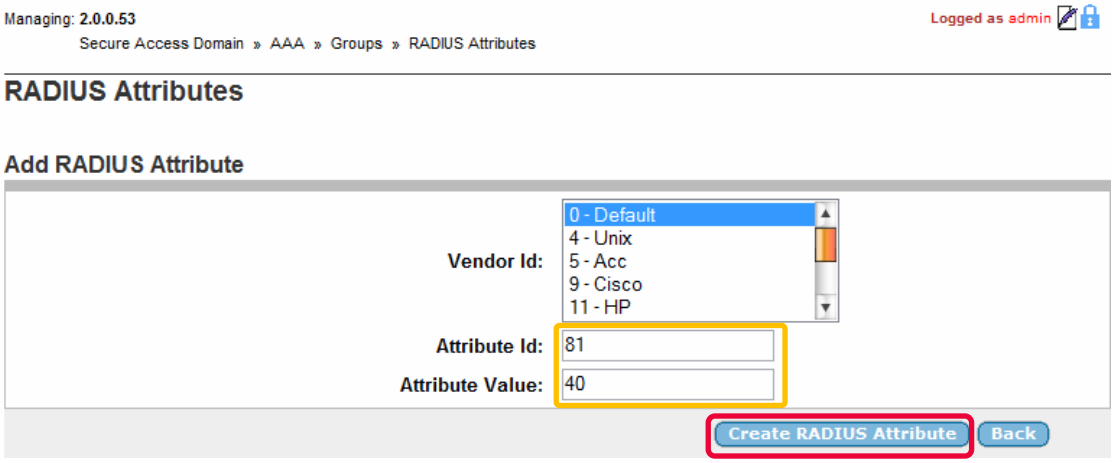
2 **In the Vendor Id list select *0 – Default*. In the *Attribute Id* field enter *64*. In the *Attribute Value* field enter 13. Click *Create RADIUS Attribute*.**



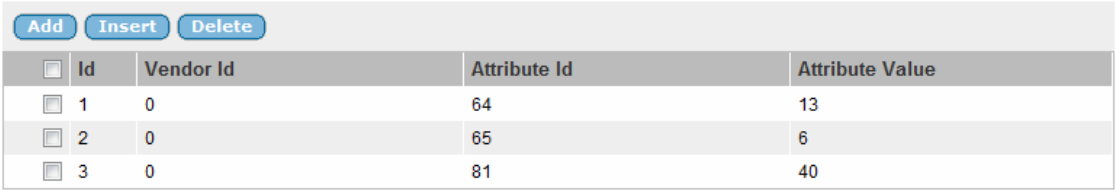
3 **In the Vendor Id list select *0 – Default*. In the *Attribute Id* field enter *65*. In the *Attribute Value* field enter 6. Click *Create RADIUS Attribute*.**



4 **In the Vendor Id list select *0 – Default*. In the *Attribute Id* field enter *81* In the *Attribute Value* field enter the VLAN ID *40*. Click *Create RADIUS Attribute*.**



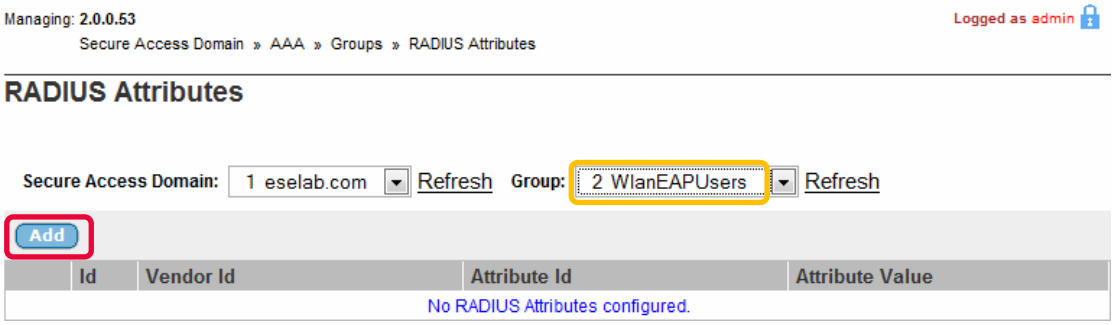
5 **RADIUS attributes will now be assigned to the WiredEAPUsers group which will assign authenticated users to VLAN 40.**



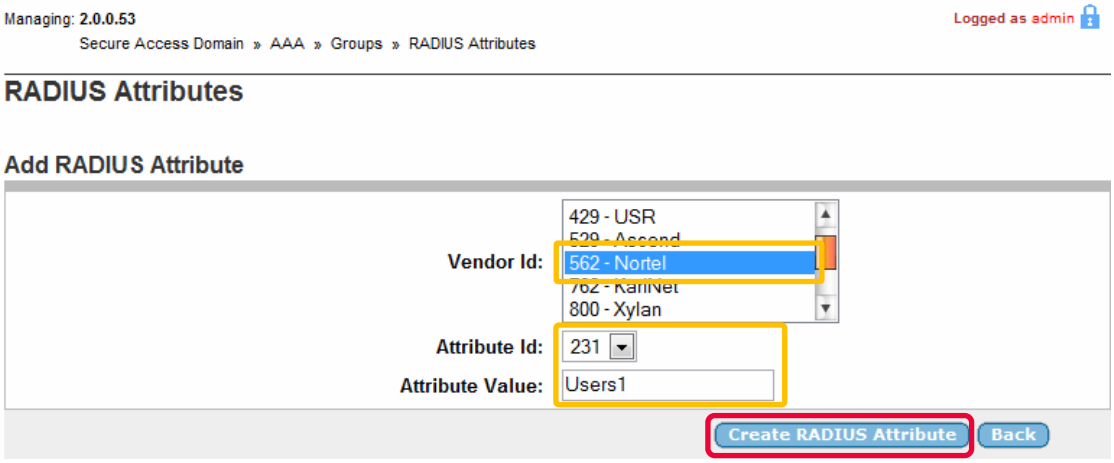
Id	Vendor Id	Attribute Id	Attribute Value
1	0	64	13
2	0	65	6
3	0	81	40

6 **Using the Browser Based Interface (BBI) navigation tree click *Secure Access Domain*, *AAA*, *Groups* then *RADIUS Attributes*. In the *Group* pull-down menu select the group**

***WlanEAPUsers* and click *Add*.**

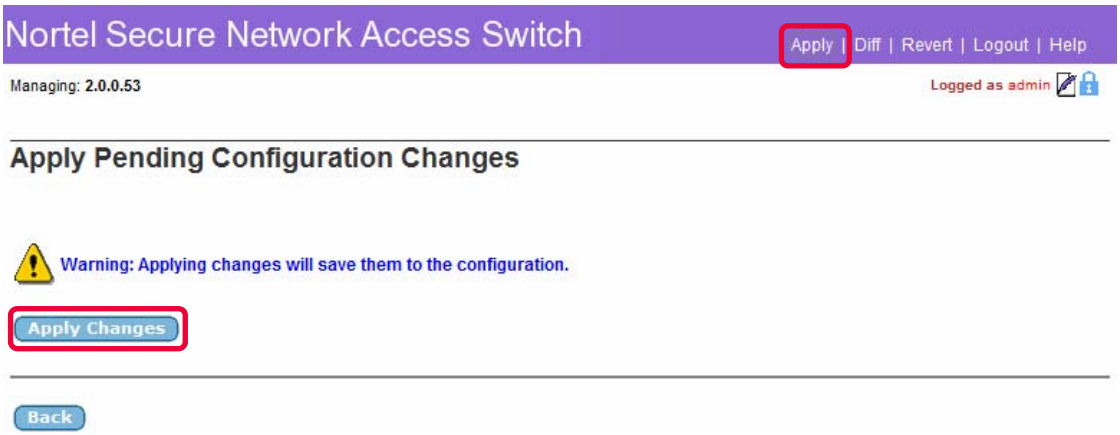


7 **In the Vendor Id list select *562 – Nortel*. In the *Attribute Id* field select 231. In the *Attribute Value* field enter the VLAN name *Users1*. Click *Create RADIUS Attribute*.**



8 **RADIUS attributes will now be assigned to the WlanEAPUsers group which will assign authenticated users to a VLAN named Users1.**

9 **Apply and save the changes by clicking *Apply* and then *Apply Changes*.**



2.2 Ethernet Routing Switch:

This section provides configuration steps required to configure a Nortel Ethernet Switch to support Microsoft Network Access Protection EAP clients. For this section the following configuration steps will be performed:

1. IP Addressing (Section 2.2.1)
2. Virtual LANs (Section 2.2.2)
3. RADIUS Server (Section 2.2.3)
4. EAPOL (Section 2.2.4)

2.2.1 IP Addressing:

The following IP addressing will be defined on the Nortel Ethernet Routing Switch to support switch management and RADIUS server communications:

- IP Address – 192.168.10.10
- Network Mask – 255.255.255.0
- Default Gateway – 192.168.10.1

IP addressing can be defined on a Nortel Ethernet Switch by using the following procedure:

1 Specify the IP address of the Ethernet Switch by issuing the *ip address switch <ip-address> netmask <network-mask>* command:

ERS5500(config)# ***ip address switch 192.168.10.10 netmask 255.255.255.0***

2 Specify a default gateway for the Ethernet Switch by issuing the *ip default-gateway <router-ip-address>* command:

ERS5500(config)# ***ip default-gateway 192.168.10.1***

2.2.2 Virtual LANs:

The following VLAN configuration will be defined on the Nortel Ethernet Switch:

- In compliance with Nortel's best practice implementation recommendations all ports will be removed from the default VLAN id 1.
- Three port based VLANs will be defined:
  - VLAN 10 – Dedicated management VLAN.
  - VLAN 40 – User VLAN used for authenticated EAP users.
- The uplink port 48 will be configured to TagAll frames and will be added as a member of VLANs 10 and 40.
- In compliance with Nortel's best practice implementation recommendations the uplink port 48 will be configured to discard untagged frames.

VLAN configuration can be defined on a Nortel Ethernet Switch by using the following procedure:

1 Rename the default VLAN by issuing the *vlan name <vlan-id> <vlan-name>* command:

ERS5500(config)# ***vlan name 1 Default***

2 Create a management VLAN by issuing the *vlan create <vlan-id> name <vlan-name> type port* command:

ERS5500(config)# ***vlan create 10 name SERVICES type port***

3 Create a Green VLAN for trusted users by issuing the *vlan create <vlan-id> name <vlan-name> type port* command:

ERS5500(config)# ***vlan create 40 name USERS1 type port***

4 Enable 802.1Q tagging on the uplink port by issuing the *vlan ports <port-list> tagging tagall* command:

ERS5500(config)# ***vlan ports 48 tagging tagall***

5 Remove all port from the default VLAN by issuing the *vlan members remove <vlan-id> all* command.

ERS5500(config)# ***vlan members remove 1 all***

6 Add the management, Green and Yellow VLANs to the uplink port by issuing the *vlan members add <vlan-id> <port-list>* command.

ERS5500(config)# ***vlan members add 10 48***

ERS5500(config)# ***vlan members add 40 48***

7 Enabled the discard untagged frames feature on the uplink port by issuing the *vlan ports <port-list> filter-untagged-frame enable* command:

ERS5500(config)# ***vlan ports 48 filter-untagged-frame enable***

8 Specify the management VLAN ID created in step 2 by issuing the *vlan mgmt <vlan-id>* command:

ERS5500(config)# ***vlan mgmt 10***

2.2.3 RADIUS Server:

The following RADIUS configuration will be defined on the Ethernet Routing Switch to authenticate NAP enabled Windows Vista and XP clients:

- RADIUS Server Host – 192.168.20.11 (Management IP Address of the SNAS)
- RADIUS Key – sharedkey

A RADIUS server host and shared key can be defined on a Nortel Ethernet Switch by using the following procedure:

1 Create a RADIUS server host entry specifying the Secure Network Access Servers management IP address by issuing the *radius-server host <ip-address>* command:

ERS5500(config)# ***radius-server host 192.168.20.11***

2 Enter and confirm a RADIUS shared key by issuing the *radius-server key* command:

ERS5500(config)# ***radius-server key***

Enter key: ******

Confirm key: ******

The RADIUS shared key must match the shared secret defined on the Secure Network Access Switch.

2.2.4 EAPOL:

The following EAPOL configuration will be defined on the Ethernet Routing Switch to authenticate NAP enabled Windows Vista and XP clients:

- EAPOL will be enabled on access ports 1 – 47 with the following parameters defined:
  - Re-authentication will be enabled with a re-authentication period of 300 seconds (5 minutes).
  - The quiet period will be lowered from 60 seconds to 10 seconds.
- EAPOL will be globally enabled on the switch.

EAPOL port settings and global status can be defined on a Nortel Ethernet Switch by using the following procedure:

1 Enable EAP support on access ports by issuing the *eapol status auto* command:

ERS5500(config)# ***interface fastEthernet 1-47***

ERS5500(config-if)# ***eapol status auto***

2 Enable EAP re-authentication support by issuing the *eapol re-authentication enable*

command:

ERS5500(config-if)# ***eapol re-authentication enable***

3 **Specify a re-authentication period by issuing the *eapol re-authentication-period <interval>* command:**

ERS5500(config-if)# ***eapol re-authentication-period 300***

4 **Specify a EAP quiet-interval by issuing the *eapol quiet-interval <interval>* command:**

ERS5500(config-if)# ***eapol quiet-interval 10***

5 **Globally enable EAPOL support on the Ethernet Switch by issuing the *eapol enable* command:**

ERS5500(config-if)# ***exit***

ERS5500(config)# ***eapol enable***

2.3 Nortel Wireless LAN 2300 Controller:

This section provides the minimum configuration steps required to configure a Nortel WLAN 2300 Controller to support 802.1X enabled clients and forward authentication requests to the Nortel Secure Network Access Switch.

For this section the following configuration steps will be performed:

1. Base Configuration (Section 2.3.1)
2. VLAN Configuration (Section 2.3.2)
3. RADIUS Server Configuration (Section 2.3.3)
4. Service-Profile Configuration (Section 2.3.4)
5. Radio-Profile Configuration (Section 2.3.5)
6. Access Point Configuration (Section 2.3.6)

2.3.1 Base Configuration:

The following baseline configuration will performed on the Nortel WLAN 2300 Controller:

- The system name will be set to WSS2350-1.
- The country of operation will be set to US.
- The management IP address 192.168.10.22 will be defined as the System-IP address which will be used for AP / Controller communications.
- An admin username and password will be created for management access.
- The enable password required for configuration access will be set.
- The default IP interface 1 will be removed.
- All ports will be removed from VLAN 1.

A minimum baseline configuration may be established on a Nortel WLAN 2300 Controller using CLI with the following steps:

1	Specify the name of the

NT2350-30E0E1# ***set system name WSS2350-1***

2	Specify the country of operation which determines the regulatory operation of the 2.4Ghz and 5Ghz radios based on region.

WSS2350-1# ***set system countrycode US***

This will cause all APs to reboot. Are you sure? (y/n) [n] ***y***

3	Specify the System-IP address which determines the interface used for management and AP communications.

WSS2350-1# ***set system ip-address 192.168.10.22***

This will cause all APs to reboot. Are you sure? (y/n) [n] ***y***

4 Create and admin username and specify a password.

WSS2350-1# ***set user admin password adminpassword***

5 Set the enable password.

WSS2350-1# ***set enablepass***

Enter old password: <Enter>

Enter new password: ***enablepassword***

Retype new password: ***enablepassword***

6 Remove the default interface 1 which is assigned to VLAN 1.

WSS2350-1# ***clear interface 1 ip***

7 Remove VLAN 1 membership from ports 1 – 2.

WSS2350-1# ***clear vlan 1 port 1-2***

This may disrupt user connectivity. Do you wish to continue? (y/n) [n] ***y***

8 Save the changes.

WSS2350-1# ***save config***

2.3.2 VLAN Configuration:

Two VLANs will be created on the Nortel WLAN 2300 Controller to be used for controller management and users. Additionally the management and user VLANs will be 802.1Q tagged to the uplink port 1 to provide connectivity to the core network:

- VLAN 10 – Named SERVICES will be used for switch management and will be 802.1Q tagged on port 1.
- VLAN 40 – Named USERS1 will be used for users upon successful authentication and will be 802.1Q tagged on port 1.
- A management IP Address 192.168.10.22 and Subnet Mask 255.255.255.0 will be defined on VLAN 10.
- The default route 192.168.10.1 with a cost of 1 will be created.

VLANs may be created on a Nortel WLAN 2300 Controller using CLI with the following steps:

1 Create a management VLAN. ID 10 named SERVICES and add the uplink port 1 as a 802.1Q tagged member.

WSS2350-1# ***set vlan 10 name SERVICES port 1 tag 10***

2 Create a user VLAN ID 40 named USERS1 and add the uplink port 1 as a 802.1Q tagged member.

WSS2350-1# ***set vlan 40 name USERS1 port 1 tag 40***

3 Specify the management IP Address and Network Mask on Interface 10 which will be tied to the management VLAN ID 10.

WSS2350-1# ***set interface 10 ip 192.168.10.22 255.255.255.0***

4 Create a default route.

WSS2350-1# ***set ip route default 192.168.10.1 1***

5 Save the changes.

WSS2350-1# ***save config***

2.3.3 RADIUS Server Configuration:

The Nortel Secure Network Access Switch will be defined on the Nortel WLAN 2300 Controller as a RADIUS server host:

- A RADIUS server named NSNAS1 will be created with the IP address 192.168.20.11 with a shared key that matches the shared key specified in the RADIUS client configuration on the Secure Network Access Switch in Section 2.1.5.
- A RADIUS server group named NSNA will be created and the server NSNAS1 added.
- The System-IP Address will be specified as the source of any RADIUS requests.

A RADIUS server, RADIUS group and Client IP Address may be created on a Nortel WLAN 2300 Controller using CLI with the following steps:

1 Create a RADIUS Server named NSNAS1 with the IP Address 192.168.20.11 and key sharedsecret.

WSS2350-1# ***set radius server NSNAS1 address 192.168.20.11 key sharedsecret***

2 Create a RADIUS Server Group named NSNA with the RADIUS Server NSNAS1 as a member server.

WSS2350-1# ***set server group NSNA members NSNAS1***

3 Specify the System-IP Address as the source of all RADIUS authentication requests.

WSS2350-1# ***set radius client system-ip***

4 Save the changes.

WSS2350-1# ***save config***

2.3.4 Service-Profile Configuration:

A Service-Profile and SSID named Data will be created using WPA Enterprise to support 802.1X wireless clients:

- Service-Profile Name: Data

- SSID Name: Data
- Encryption: TKIP
- Authentication: 802.1X

A Service-Profile may be created on a Nortel WLAN 2300 Controller with CLI using the following steps:

1 Create a Service-Profile and SSID named Data.

WSS2350-1# ***set service-profile Data ssid-name Data***

2 Define the encryption cipher to be used by the Service-Profile. In this example TKIP encryption will be used.

WSS2350-1# ***set service-profile Data cipher-tkip enable***

3 Enable WPA for the Service-Profile.

WSS2350-1# ***set service-profile Data wpa-ie enable***

4 Create an authentication rule which will forward all 802.1X authentication requests to the Nortel Secure Network Access Switch.

WSS2350-1# ***set authentication dot1x ssid Data ** pass-through NSNA***

5 Assign the Service-Profile to the default Radio-Profile. The Radio-Profile defines which Radios and Access Point will service the SSID.

WSS2350-1# ***set radio-profile default service-profile Data***

6 Save the changes.

WSS2350-1# ***save config***

2.3.5 Radio-Profile Configuration:

The default Radio-Profile configuration will be modified to disable Auto Channel and Auto Tuning and allow for static Channel and Power configuration. The Radio-Profile Auto Tuning parameters may be modified on a Nortel WLAN 2300 Controller with CLI using the following steps:

1 Disable Auto Channel Tuning on the default Radio Profile.

WSS2350-1# ***set radio-profile default auto-tune channel-config disable***

2 Disable Auto Power Tuning on the default Radio Profile.

WSS2350-1# ***set radio-profile default auto-tune power-config disable***

2.3.6 Access Point Configuration:

An 802.11a/b/g Access Point profile will be created on the Nortel WLAN Security Switch and the radios added to the default Radio-Profile:

- Access Point Model: 2330A
- Serial Number: 0771100119
- Access Point Name: WAP2330A-1
- 802.11b/g Channel / Power: 8 / 18
- 802.11a Channel / Power: 36 / 19
- Radio Profile (Both Radios): default

An Access Point profile may be created on a Nortel WLAN 2300 Controller using CLI with the following steps:

1 Create an Access Point and define the Serial Number and Model.

WSS2350-1# ***set ap 1 serial-id 0771100119 model 2330A***

2 Specify a name for the Access Point.

WSS2350-1# ***set ap 1 name WAP2330A-1***

3 Specify the 2.4Ghz radios channel and power settings, assign a Radio-Profile and enable the radio.

WSS2350-1# ***set ap 1 radio 1 radio-profile default mode enable***

4 Specify the 5Ghz radios channel and power settings, assign the Radio-Profile and enable the radio.

WSS2350-1# ***set ap 1 radio 2 radio-profile default mode enable***

5 Save the changes.

WSS2350-1# ***save config***

2.4 Microsoft Windows Server 2003:

This section provides the minimum configuration steps required to configure a Nortel Ethernet Switch to support 802.1X enabled clients and forward authentication requests to the Nortel Secure Network Access Switch. For this section the following configuration steps will be performed:

1. Active Directory Users (Section 2.4.1)
2. Active Directory Groups (Section 2.4.2)

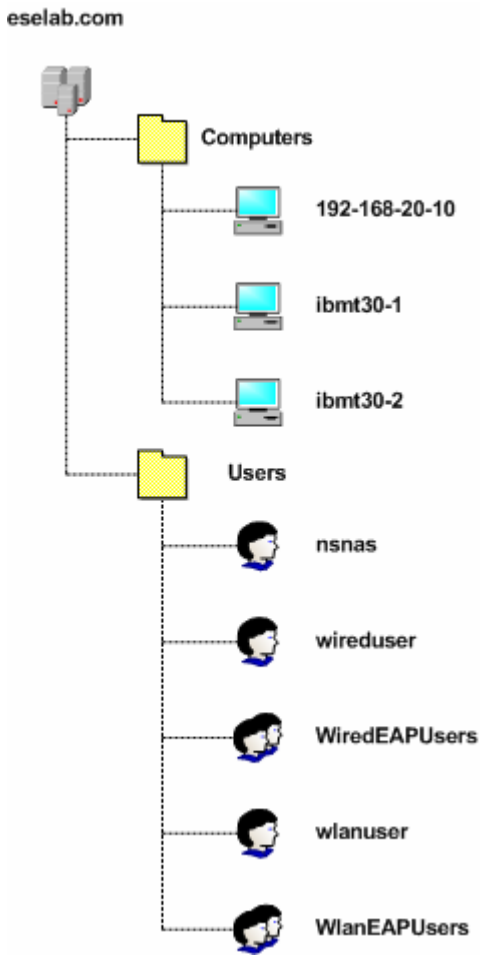


Figure 2.4 – Active Directory Tree

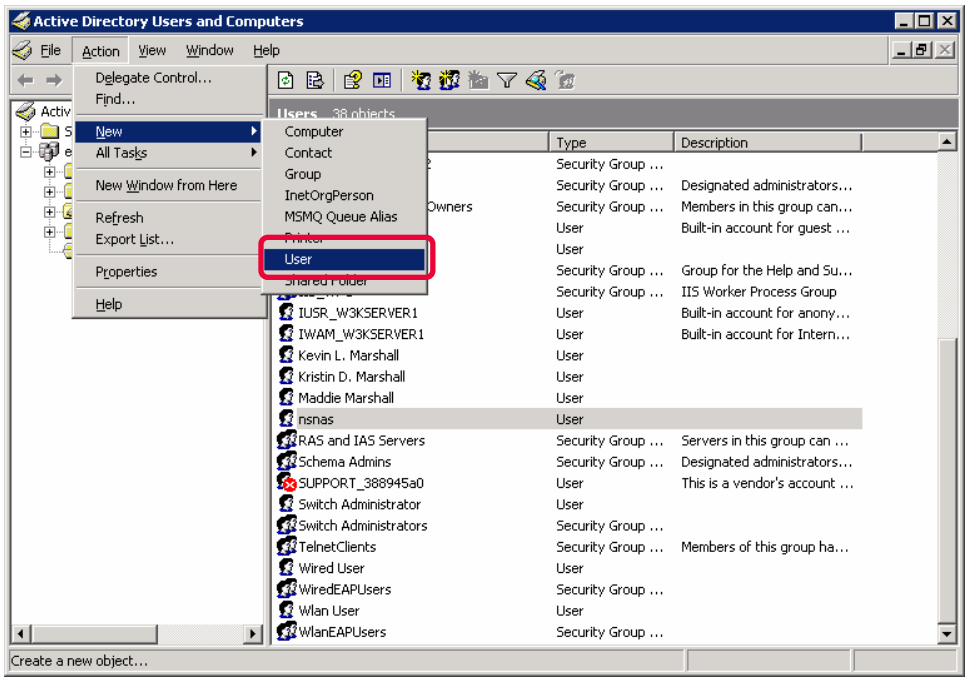
2.4.1 Active Directory Users:

The following Active Directory Users will be created on the Windows 2003 Domain Controller:

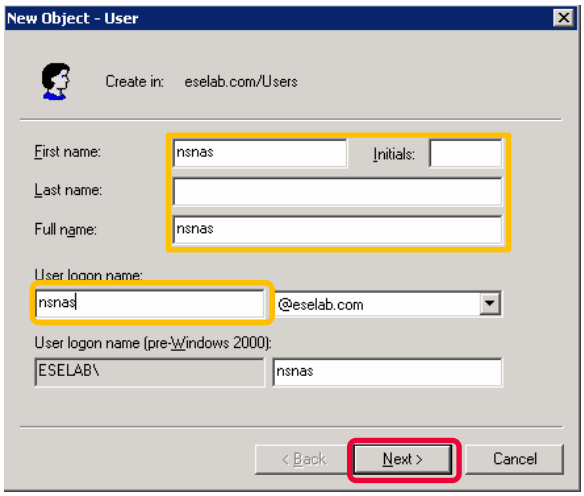
- A user named 'nsnas' used by the Nortel Secure Network Access Switch to perform the LDAP group search.
- A user named 'wireduser' to test EAP authentication on the Nortel Ethernet Switch.
- A user named 'wlanuser' to test EAP authentication on the WLAN 2300 Controller.

Active Directory Users may be created in Windows 2003 Server using the following steps:

1	**Open the *Active Directory Users* Snap-In. Click on the *Users* container and then click *Action*, *New* and then *User*.**

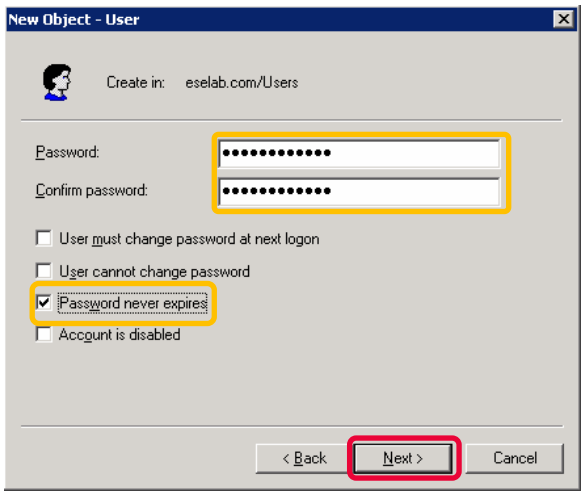


2 **In the *First Name* and *User logon name* fields enter the user name *nsnas* as defined in the *iSD Bind Name* field on the Nortel Secure Network Access Switch in Section 2.1.4.1. Click *Next*.**

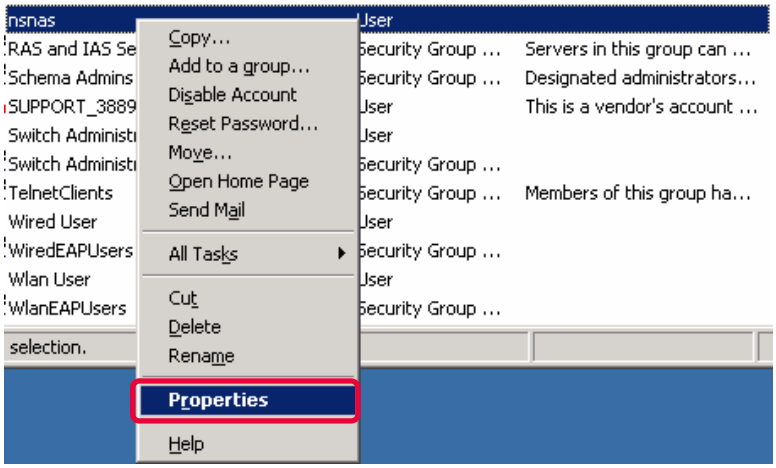


3 **In the *Password* fields enter and confirm the password as defined in the *iSD Bind Password* field on the Nortel Secure Network Access Switch in section 2.1.4.1. Check**

the option Password never expires and click *Next*. Verify the new account information and click *Finish*.

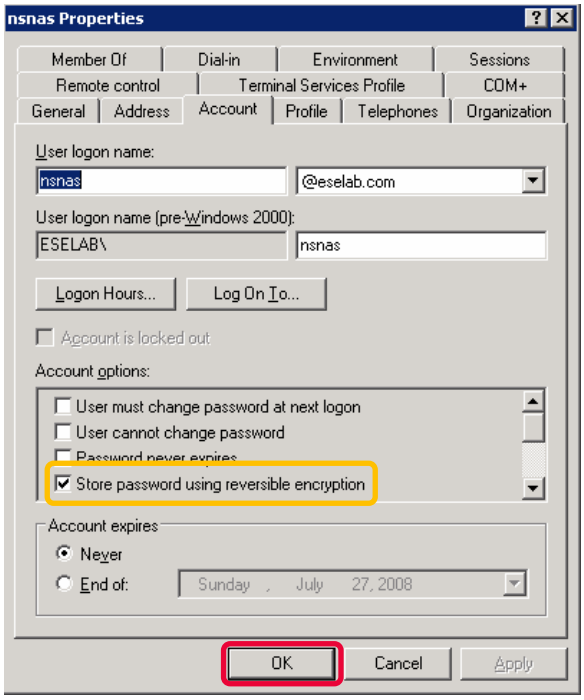


4 **In the *Active Directory Users* Snap-In highlight the user name *nsnas*, right click and then select *Properties*.**

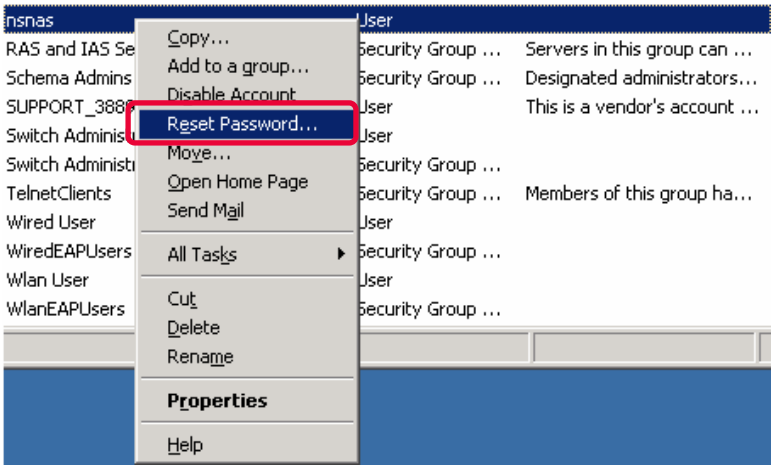


5 **Click on the *Account* tab and in *Account Options* check the option *Store password***

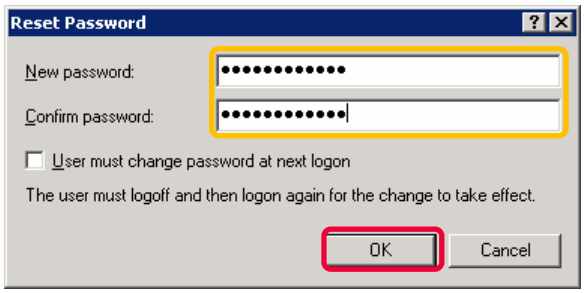
***using reversible encryption*. Click *OK*.**



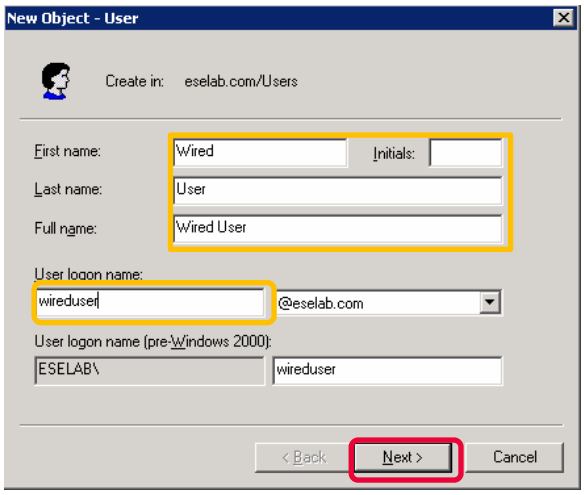
6 **In the *Active Directory Users* Snap-In highlight the user name *nsnas*, right click and then select *Reset Password*.**



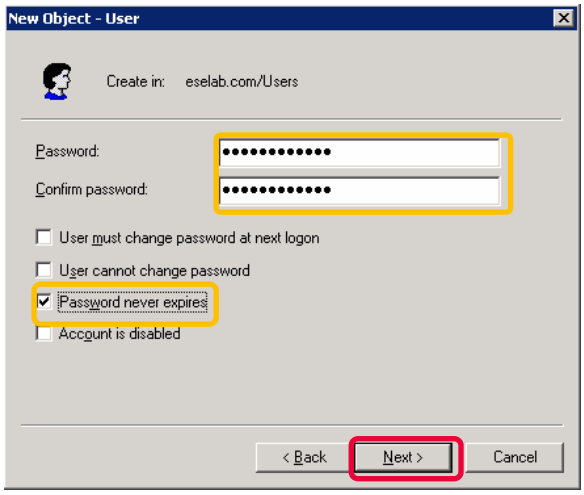
7 **In the *Password* fields enter and confirm the password as defined in the *iSD Bind Password* field on the Nortel Secure Network Access Switch in section 2.1.4.1. Check the option Password never expires and click *OK*.**



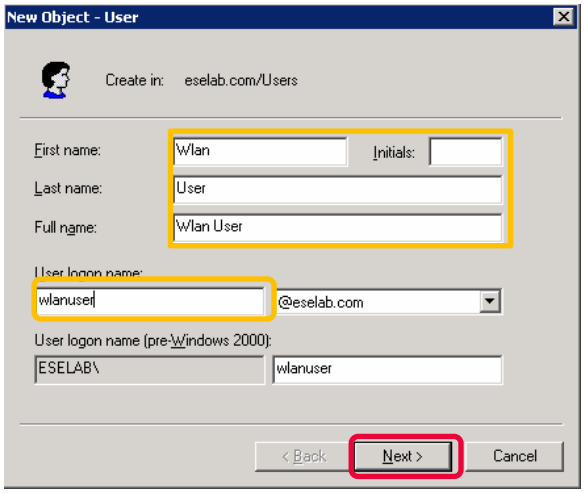
8 **In the *Active Directory Users* Snap-In add a new user. Enter the appropriate user information for the Wired EAP test user and click Next.**



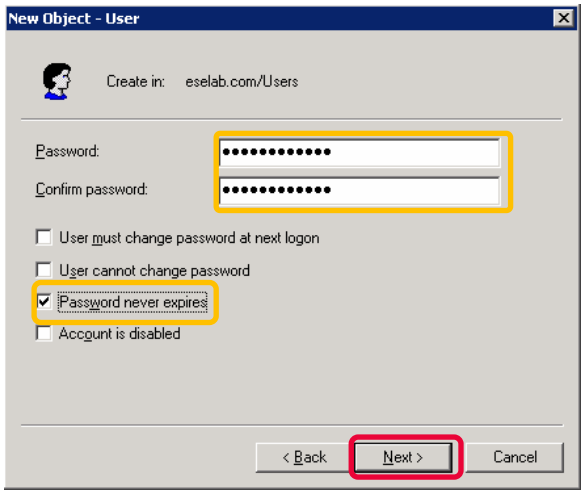
9 **Enter and confirm a password for the Wired EAP test user. Check the option *Password never expires* and click *Next*. Verify the new account information and click *Finish*.**



10 **In the *Active Directory Users* Snap-In add a new user. Enter the appropriate user information for the Wireless LAN EAP test user and click Next.**



11 **Enter and confirm a password for the Wired EAP test user. Check the option *Password never expires* and click *Next*. Verify the new account information and click *Finish*.**



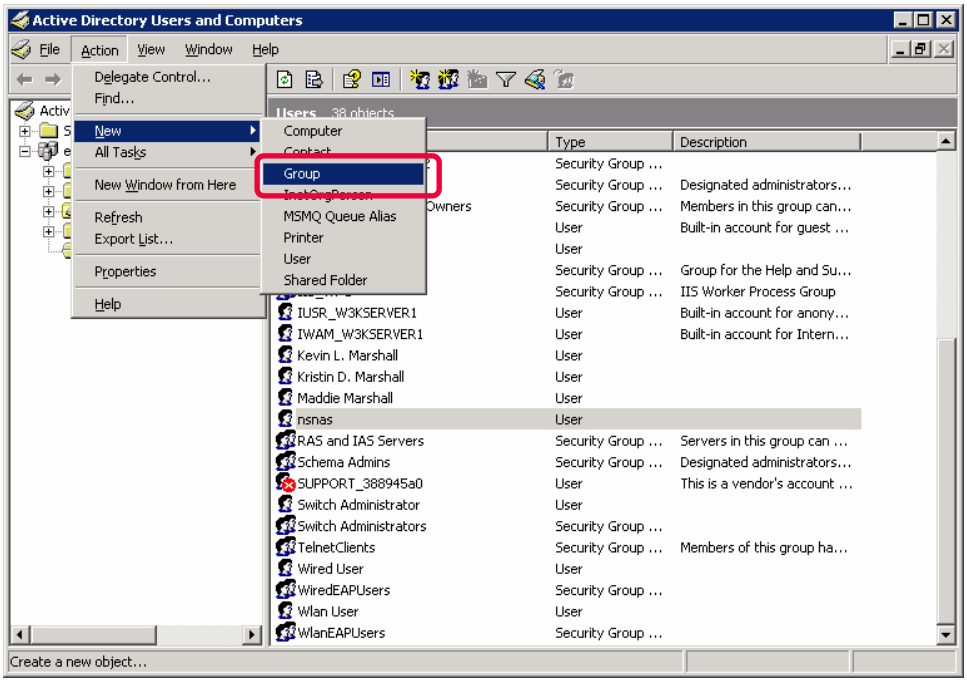
2.4.2 Active Directory Groups:

The following Active Directory Groups will be created on the Windows 2003 Domain Controller:

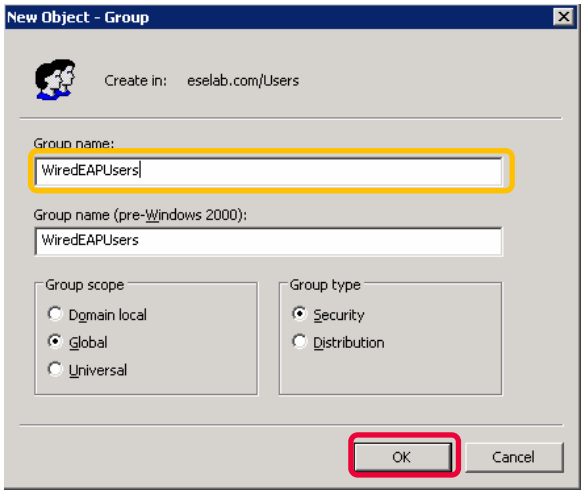
- A group named 'WiredEAPUsers' used for Wired EAP User authentication which matches the group name defined on the Nortel Secure Network Access Switch.
- A group named 'WlanEAPUsers' used for Wireless EAP User authentication which matches the group name defined on the Nortel Secure Network Access Switch.
- The user named 'wireduser' will be added as a member to the group 'WiredEAPUsers'.
- The user named 'wlanuser' will be added as a member to the group 'WlanEAPUsers'.

Active Directory Groups may be created in Windows 2003 Server using the following steps:

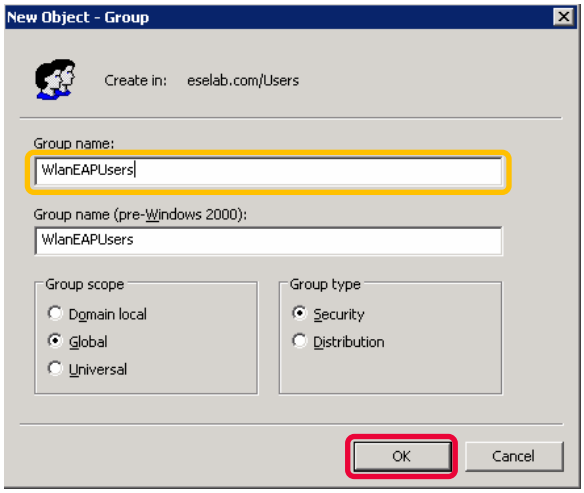
1 **Open the *Active Directory Users* Snap-In. Click on the *Users* container and then click *Action*, *New* and then *Group*.**



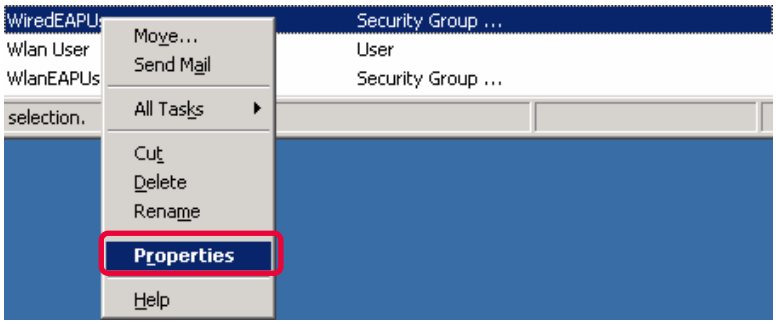
2 **In the Group name field enter the name *WiredEAPUsers* and click *OK*.**



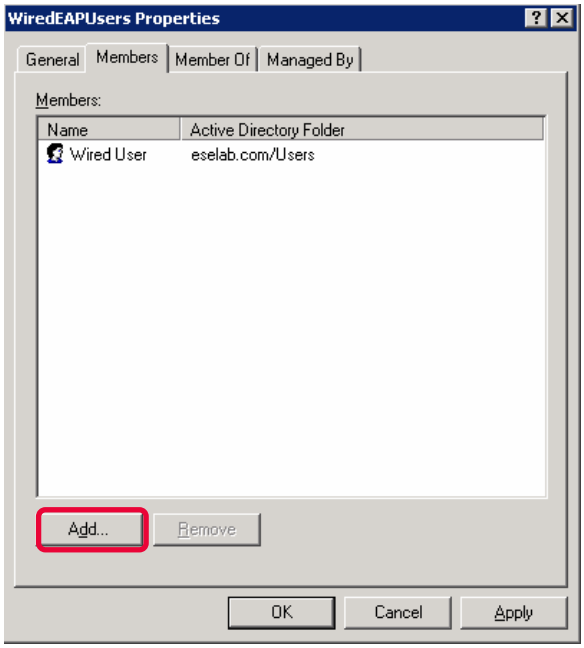
3 **In *Active Directory Users* Snap-In create a new group. In the Group name field enter the name *WlanEAPUsers* and click *OK*.**



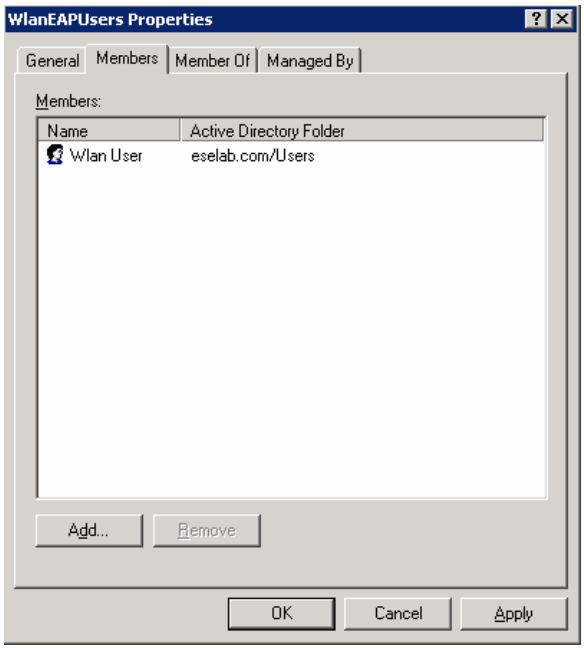
4 **In *Active Directory Users* Snap-In highlight the group *WiredEAPUsers*, right click and select *Properties*.**



5 **Select the Members tab and click *Add*. Type the name of the Wired EAP test user and click *OK* to add the user to the group. Click *Apply*.**



6 **In *Active Directory Users* Snap-In highlight the group *WlanEAPUsers*, right click and select *Properties*. Select the Members tab and click *Add*. Type the name of the Wlan EAP test user and click *OK* to add the user to the group. Click *Apply*.**



2.5 Microsoft Windows XP Professional:

This section provides the minimum configuration steps required to enable 802.1X authentication on a Windows XP Professional workstation. For this section the following configuration steps will be performed:

1. Windows Services (Section 2.5.1)
2. Local Area Network Configuration (Section 2.5.2)
3. Wireless Network Connection Configuration (Section 2.5.3)

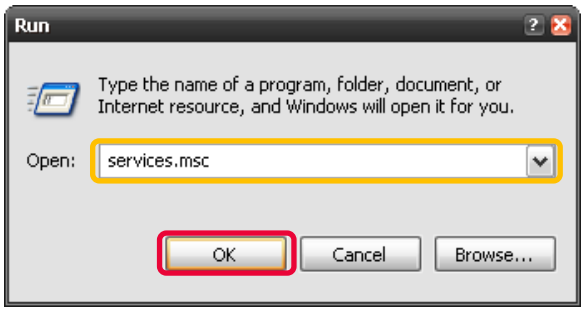
2.5.1 Windows Services:

To support 802.1X authentication the following services need to be enabled on the Windows XP Professional workstation:

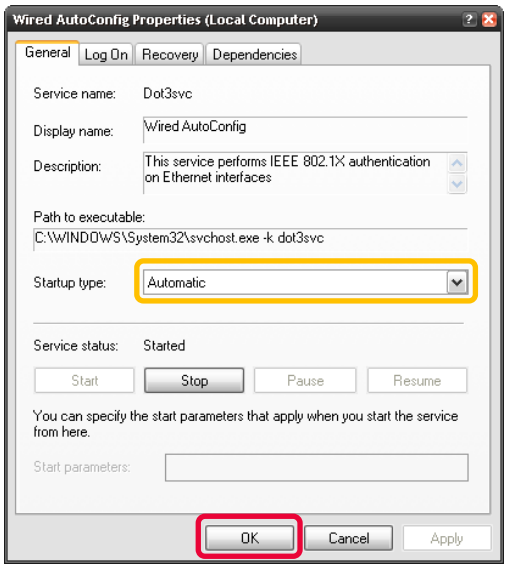
Windows XP Version	Interface Type	Required Service Name
Service Pack 2 and below	Ethernet & Wireless LAN	Wireless Zero Configuration
Service Pack 3 and above	Ethernet	Wired AutoConfig
Service Pack 3 and above	Wireless LAN	Wireless Zero Configuration

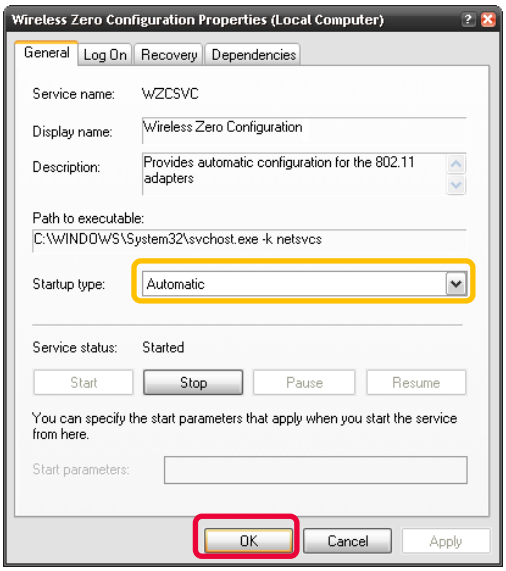
Services may be enabled on a Windows XP Professional workstation using the following steps:

1 Open the Services Snap-In by clicking *Start* and then *Run*. In the *Open* field type *services.msc* and then click *OK*.



2 **Locate the services named *Wireless Zero Configuration* and if-applicable *Wired AutoConfig*. Access the properties for each service and set the Startup type to *Automatic*. If a service is stopped click *Start* to enable the service. Click OK.**





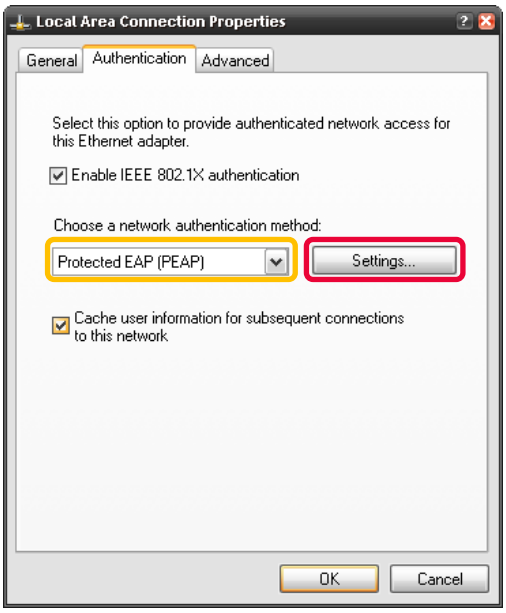
2.5.2 Local Area Network Configuration:

The following configuration will be performed on the Local Area Network Connection to support PEAP authentication to the Nortel Ethernet Switch:

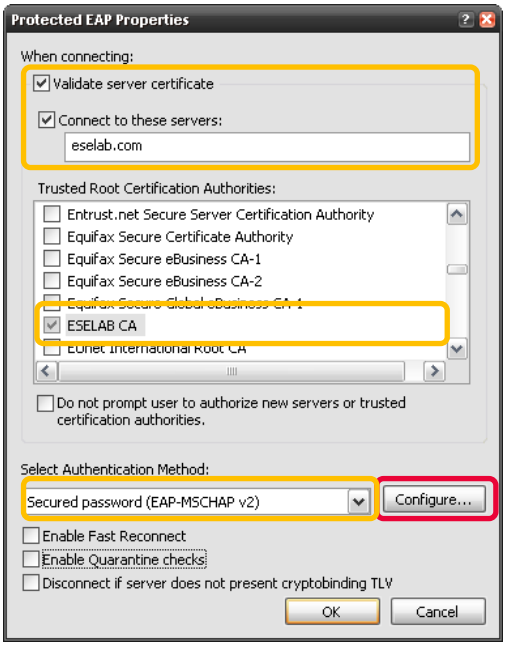
- IEEE 802.1X authentication will be enabled.
- Protected EAP (PEAP) with EAP-MSCHAPv2 will be selected.
- Certificate verification will be configured.

802.1X may be enabled on a Local Area Network Connection in Windows XP Professional using the following steps:

1 **Access the *Local Area Connection Properties* and select the *Authentication* tab. Check the option *Enable IEEE 802.1X authentication* and set the authentication method to *Protected EAP (PEAP)*. Click *Settings*.**



2 **In the Protected EAP Properties window optionally check the options *Validate server certificate* and *Connect to these servers*. If validating the server certificate enter the appropriate domain name and select the root certificate. Select the Authentication Method *Secure password (EAP-MSCHAP v2)*. Click *Configure*.**



3	**For single sign-on support check the option *Automatically use my Windows logon name and password (and domain if any)*. Uncheck this option to manually enter a username / password each time you connect to the switch. Click *OK*.**

4	**If the *Connect to these servers* option was enabled and a specific host entry not specified, the following dialog will be displayed when you first connect to the Ethernet Switch requesting that you validate the connection. Click *OK* to accept the connection which will add the host to the connection list.**

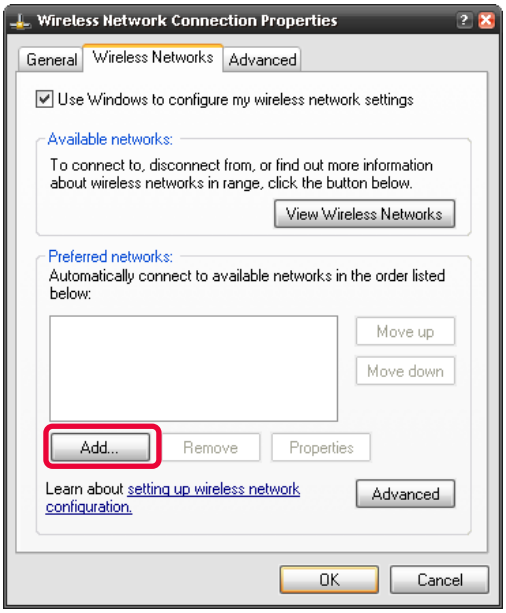
2.5.3 Wireless Network Connection Configuration:

The following configuration will be performed on the Wireless Network Connection to support PEAP authentication to the Nortel WLAN 2300 Controller:

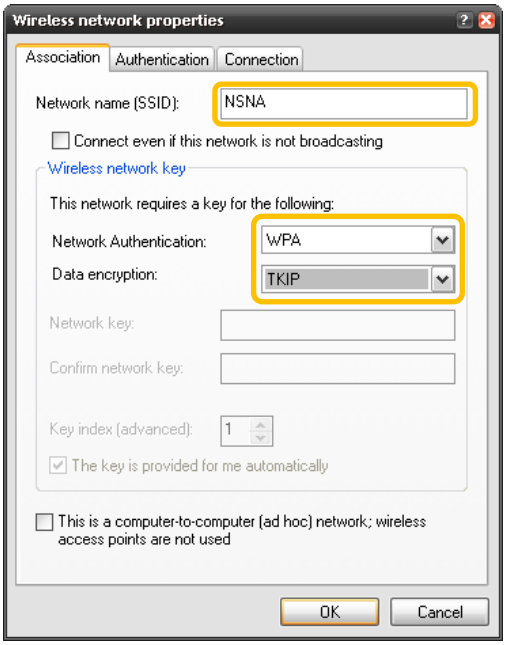
- A Wireless Network Profile will be created.
- IEEE 802.1X authentication will be enabled.
- Protected EAP (PEAP) with EAP-MSCHAPv2 will be selected.
- Certificate verification will be configured.

802.1X may be enabled on a Wireless Network Connection in Windows XP Professional using the following steps:

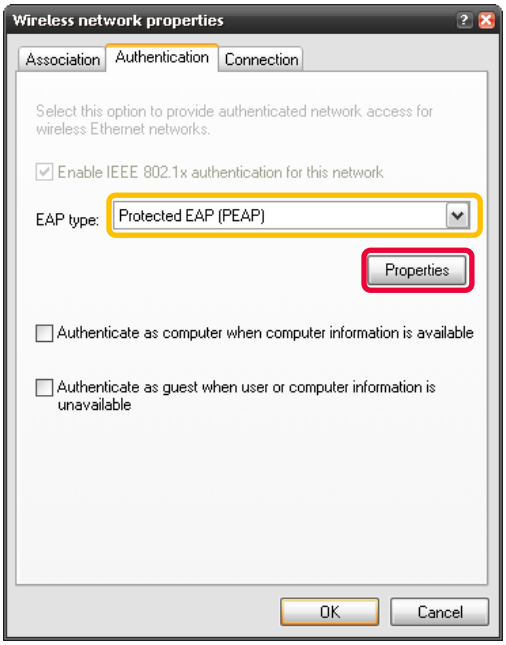
1 **Access the *Wireless Network Connection Properties* and select the *Wireless Networks* tab. Click *Add* to create a new Wireless Profile.**



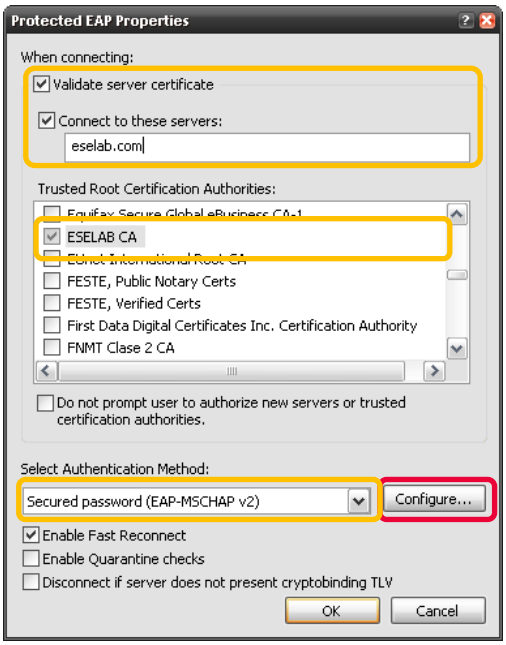
2 **Type the *Network Name (SSID)* and select the *Network Authentication* and *Data Encryption* types.**



3 **Click on the Authentication tab. Check the option *Enable IEEE 802.1X authentication* and set the authentication method to *Protected EAP (PEAP)*. Click *Properties*.**



4 **In the Protected EAP Properties window optionally check the options *Validate server certificate* and *Connect to these servers*. If validating the server certificate enter the appropriate domain name and select the root certificate. Select the Authentication Method *Secure password (EAP-MSCHAP v2)*. Click *Configure*.**



5	**For single sign-on support check the option *Automatically use my Windows logon name and password (and domain if any)*. Uncheck this option to manually enter a username / password each time you connect to the WLAN. Click *OK*.**

6	**If the *Connect to these servers* option was enabled and a specific host entry not specified, the following dialog will be displayed when you first connect to the Ethernet Switch requesting that you validate the connection. Click *OK* to accept the connection which will add the host to the connection list.**

2.6 Microsoft Windows Vista:

This section provides the minimum configuration steps required to enable 802.1X authentication on a Windows Vista workstation. For this section the following configuration steps will be performed:

1. Windows Services (Section 2.6.1)
2. Local Area Network Configuration (Section 2.6.2)
3. Wireless Network Connection Configuration (Section 2.6.3)

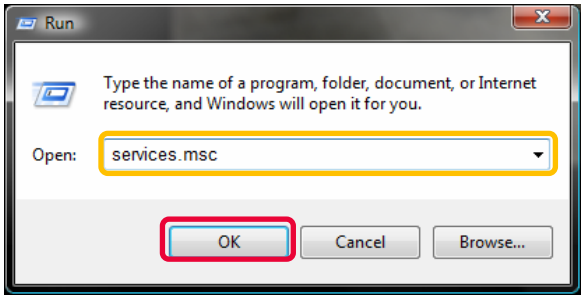
2.6.1 Windows Services:

To support 802.1X authentication the following services need to be enabled on the Windows Vista workstation:

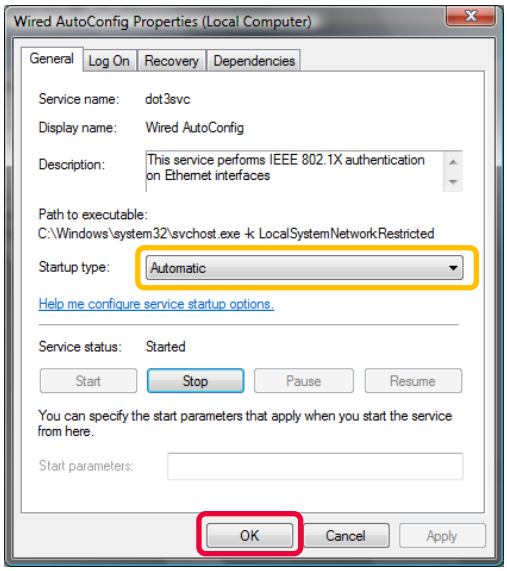
Windows XP Version	Interface Type	Required Service Name
All Versions	Ethernet	Wired AutoConfig
All Versions	Wireless LAN	Wireless Zero Configuration

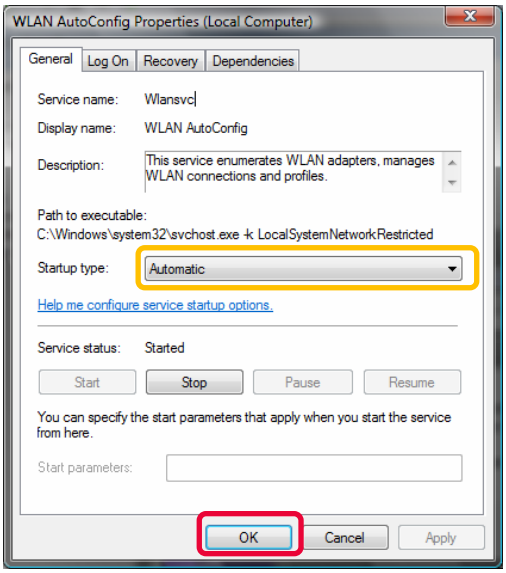
Services may be enabled on a Windows Vista workstation using the following steps:

1 **Open the Services Snap-In by clicking *Start* and then *Run*. In the *Open* field type *services.msc* and then click *OK*.**



2 **Locate the services named *Wireless Zero Configuration* and *Wired AutoConfig*. Access the properties for each service and set the Startup type to *Automatic*. If a service is stopped click *Start* to enable the service. Click OK.**





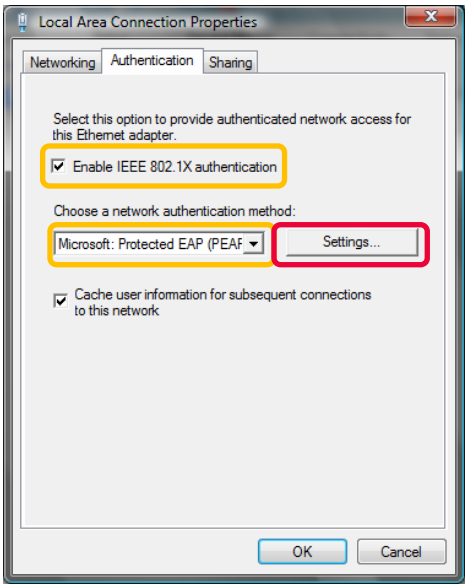
2.6.2 Local Area Network Configuration:

The following configuration will be performed on the Local Area Network Connection to support PEAP authentication to the Nortel Ethernet Switch:

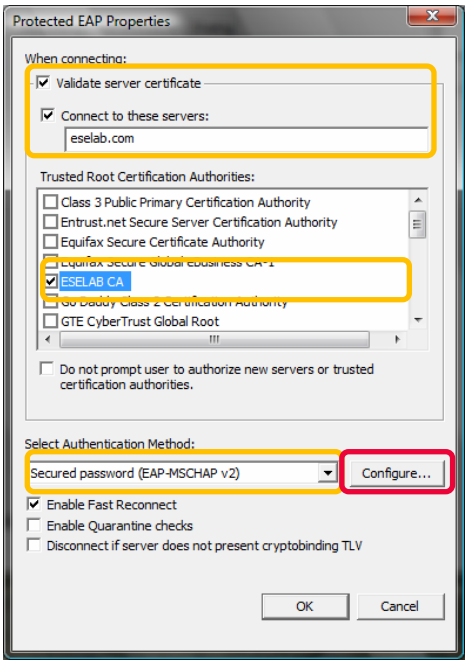
- IEEE 802.1X authentication will be enabled.
- Protected EAP (PEAP) with EAP-MSCHAPv2 will be selected.
- Certificate verification will be configured.

802.1X may be enabled on a Local Area Network Connection in Windows Vista using the following steps:

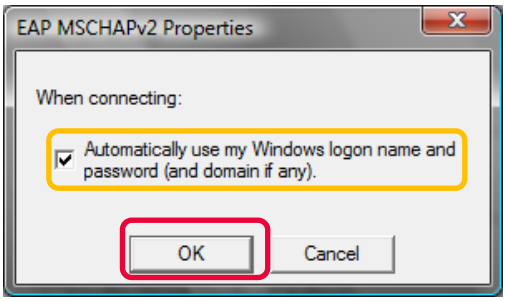
1 **Access the *Local Area Connection Properties* and select the *Authentication* tab. Check the option *Enable IEEE 802.1X authentication* and set the authentication method to *Protected EAP (PEAP)*. Click *Settings*.**



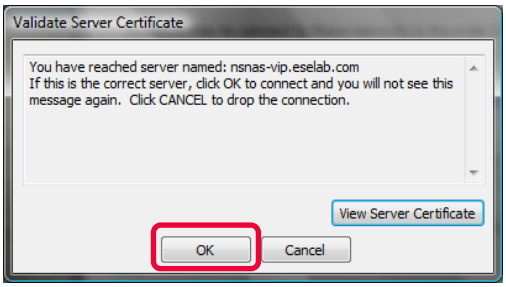
2 **In the Protected EAP Properties window optionally check the options *Validate server certificate* and *Connect to these servers*. If validating the server certificate enter the appropriate domain name and select the root certificate. Select the Authentication Method *Secure password (EAP-MSCHAP v2)*. Click *Configure*.**



3	**For single sign-on support check the option *Automatically use my Windows logon name and password (and domain if any)*. Uncheck this option to manually enter a username / password each time you connect to the switch. Click *OK*.**



4	**If the *Connect to these servers* option was enabled and a specific host entry not specified, the following dialog will be displayed when you first connect to the Ethernet Switch requesting that you validate the connection. Click *OK* to accept the connection which will add the host to the connection list.**



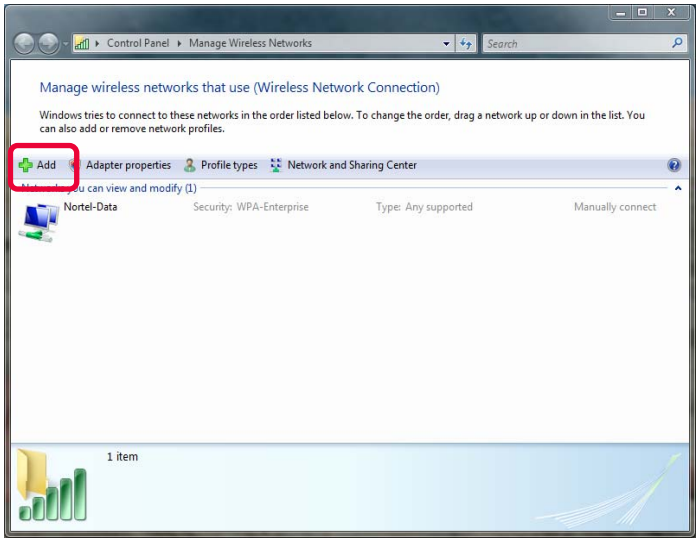
2.6.3 Wireless Network Connection Configuration:

The following configuration will be performed on the Wireless Network Connection to support PEAP authentication to the Nortel WLAN 2300 Controller:

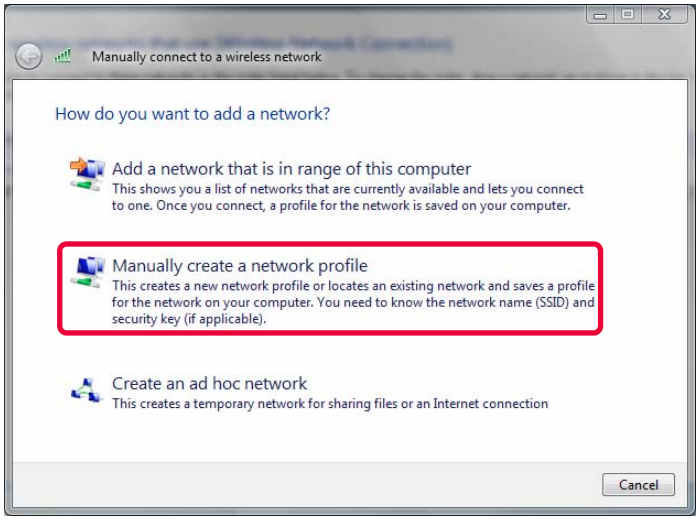
- A Wireless Network Profile will be created.
- IEEE 802.1X authentication will be enabled.
- Protected EAP (PEAP) with EAP-MSCHAPv2 will be selected.
- Certificate verification will be configured.

802.1X may be enabled on a Wireless Network Connection in Windows XP Professional using the following steps:

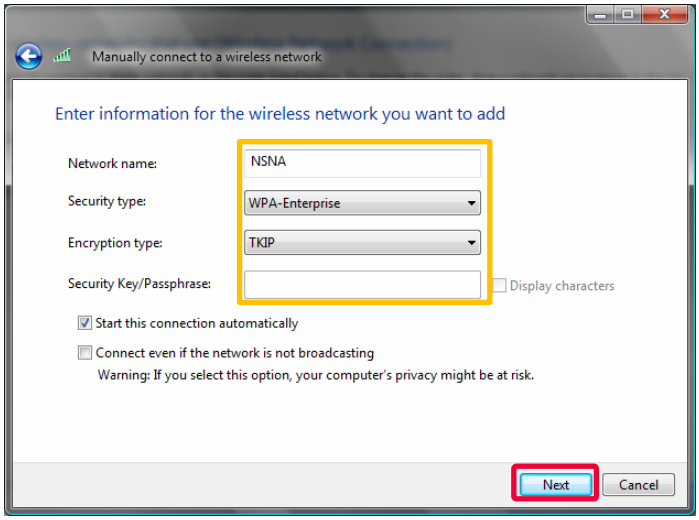
1 **Click *Start*, *Control Panel* then *Manage Wireless Networks*. Create a new Wireless LAN profile by clicking *Add*.**



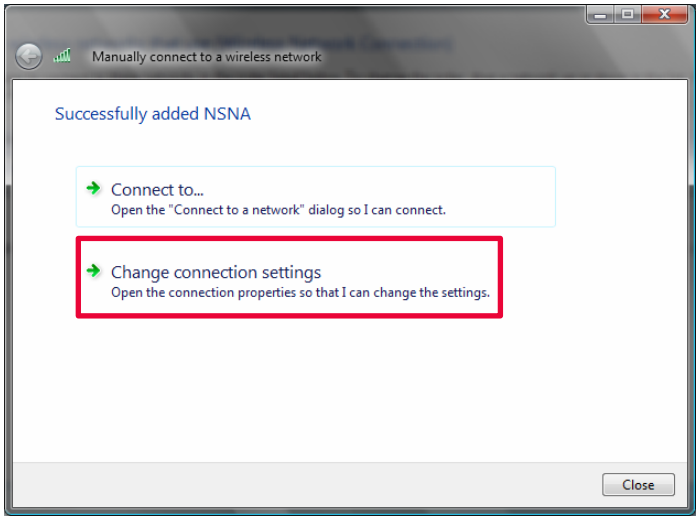
2 **Click *Manually create a network profile*.**



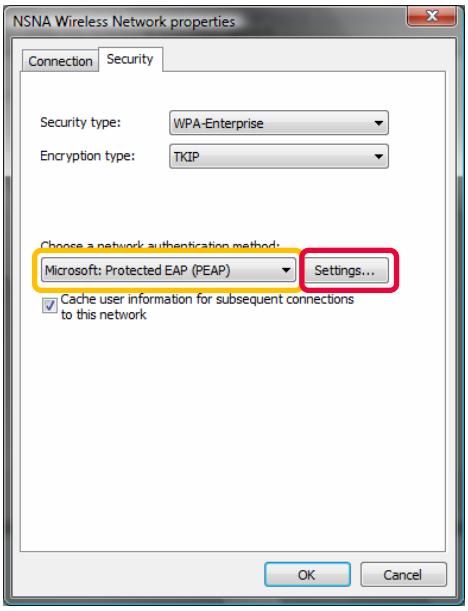
3 **Type the *Network Name (SSID)* and select the *Network Authentication* and *Data Encryption* types. Click *Next*.**



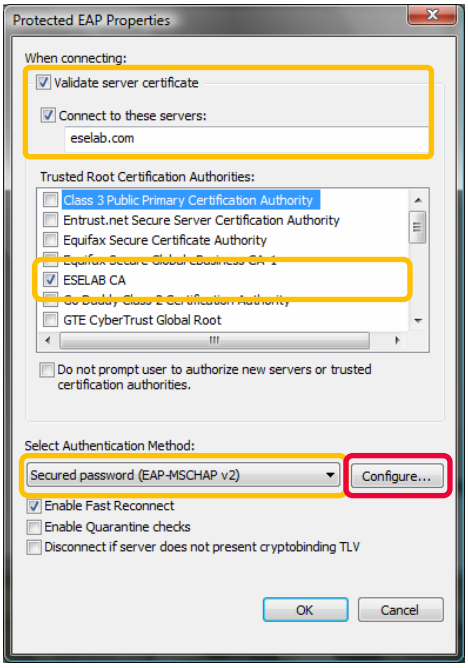
4 **Click *Change connection settings*.**



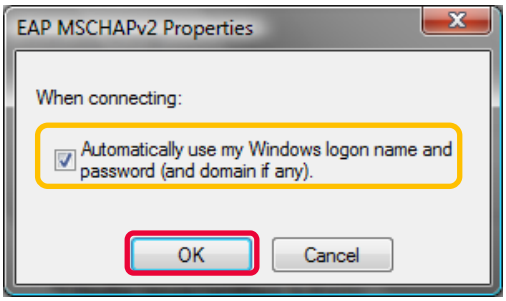
5 **Access the *Local Area Connection Properties* and select the *Authentication* tab. Check the option *Enable IEEE 802.1X authentication* and set the authentication method to *Protected EAP (PEAP)*. Click *Settings*.**



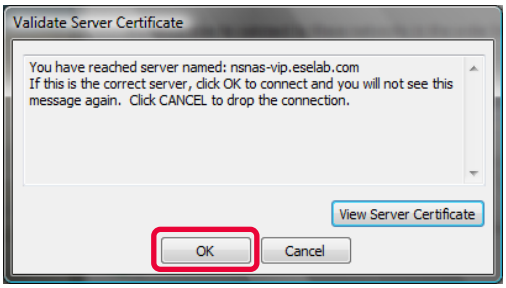
6 **In the Protected EAP Properties window optionally check the options *Validate server certificate* and *Connect to these servers*. If validating the server certificate enter the appropriate domain name and select the root certificate. Select the Authentication Method *Secure password (EAP-MSCHAP v2)*. Click *Configure*.**



7	**For single sign-on support check the option *Automatically use my Windows logon name and password (and domain if any)*. Uncheck this option to manually enter a username / password each time you connect to the switch. Click *OK*.**



8	**If the *Connect to these servers* option was enabled and a specific host entry not specified, the following dialog will be displayed when you first connect to the WLAN requesting that you validate the connection. Click *OK* to accept the connection which will add the host to the connection list.**



3. Verification:

This section provides some example CLI commands and output to verify operation after configuration has been completed.

3.1 Nortel Secure Network Access Switch:

The following CLI commands can be issued on the Nortel Secure Network Access Switch to view sessions and debug RADIUS operations:

1 **Active 802.1X session information can be viewed by issuing the *info/sessions* command.**

>> Main# *info/sessions*

```
Number of currently active sessions: 2

Domain  Switch   Port    User                Source IP        Source Mac
        Login    Type    Vlan                Portal IP        Session Type
------- ------- -------- ------------------- ---------------- -----------------
      1       0        1 ESELAB\wireduser    0.0.0.0          00:09:6b:13:23:89
          15:23    dn_pc red(0)              -                802.1x
      1       0      503 ESELAB\wlanuser     0.0.0.0          00:16:e3:2b:68:f9
        24Jun08    dn_pc red(0)              -                802.1x
```

2 **Debugging may be enabled by issuing the *maint / starttrace* command. Note that tracing may be disabled by issuing *stoptrace*.**

>> Main# ***maint/starttrace***

```
Enter tags (list of all,aaa,dhcp,dns,ssl,nha,snas,patchlink,radius,nap) [all]:
Enter Domain (or 0 for all Domains) [0]:
Output mode (interactive/tftp/ftp/sftp) [interactive]:

>> Maintenance#
15:55:26.579662: Trace started
```

3.2 Nortel Ethernet Switch:

The following NNCLI commands can be issued on the Nortel Ethernet Switch to verify configuration and debug failed 802.1X authentications.

1 The EAP configuration and authentication status of a switch port may be viewed by issuing the *show eapol port <port-number>* command.

ERS5500-2# *show eapol port 1*

```
EAPOL Administrative State:  Enabled
EAPOL User Based Policies:  Disabled
EAPOL User Based Policies Filter On MAC Addresses:  Disabled
     Admin         Admin Oper ReAuth ReAuth Quiet  Xmit   Supplic Server  Max
Port Status   Auth Dir   Dir  Enable Period Period Period Timeout Timeout Req
---- -------- ---- ----- ---- ------ ------ ------ ------ ------- ------- ---
1    Auto     Yes  Both  Both Yes    3600   10     30     30      30      2
```

2 The VLAN membership of a specific port may be viewed by issuing the *show vlan interface vids <port-number>* command.

ERS5500-2# *show vlan interface vids 1*

```
Port VLAN VLAN Name         VLAN VLAN Name         VLAN VLAN Name
---- ---- ----------------  ---- ----------------  ---- ----------------
1    40   USERS1
---- ---- ----------------  ---- ----------------  ---- ----------------
```

3 The RADIUS Server configuration may be viewed by issuing the *show radius-server* command.

ERS5500-2# *show radius-server*

```
Password Fallback:  Disabled
Primary Host:  192.168.20.11
Secondary Host:  0.0.0.0
Port:  1812
Time-out:  2
Key:  ***************
Radius Accounting is  Disabled
AcctPort:  1813
```

4 The list of configured VLANs and port membership may be viewed by issuing the *show vlan* command.

ERS5500-2# *show vlan*

```
Id  Name                 Type     Protocol         User PID Active IVL/SVL Mgmt
--- -------------------- -------- ---------------- -------- ------ ------- ----
1   DEFAULT              Port     None             0x0000   Yes    IVL     No
        Port Members: NONE
10  SERVICES             Port     None             0x0000   Yes    IVL     Yes
        Port Members: 47-48
40  USERS1               Port     None             0x0000   Yes    IVL     No
        Port Members: 47-48
Total VLANs: 3
```

5 Advanced EAPOL diagnostics for a port may be viewed by issuing the *show eapol auth-diags interface <port-number>* command.

ERS5500-2# ***show eapol auth-diags interface 1***

```
Port:  1
    EntersConnecting:                      5
    EapLogoffsWhileConnecting:             0
    EntersAuthenticating:                  2
    AuthSuccessWhileAuthenticating:        2
    AuthTimeoutsWhileAuthenticating:       0
    AuthFailWhileAuthenticating:           0
    AuthReauthsWhileAuthenticating:        0
    AuthEapStartsWhileAuthenticating:      0
    AuthEapLogoffWhileAuthenticating:      0
    AuthReauthsWhileAuthenticated:         0
    AuthEapStartsWhileAuthenticated:       0
    AuthEapLogoffWhileAuthenticated:       0
    BackendResponses:                      22
    BackendAccessChallenges:               20
    BackendOtherRequestsToSupplicant:      20
    BackendNonNakResponsesFromSupplicant:  18
    BackendAuthSuccesses:                  2
    BackendAuthFails:                      0
```

6 **EAPOL statistics for a port may be viewed by issuing the *show eapol auth-stats interface <port-number>* command.**

ERS5500-2T# ***show eapol auth-stats interface 1***

```
Port:  1
    EapolFramesRx:           24
    BackendAuthFails:        0
    EapolFramesTx:           29
    EapolStartFramesRx:      2
    EapolLogoffFramesRx:     0
    EapolRespIdFramesRx:     2
    EapolRespFramesRx:       20
    EapolReqIdFramesTx:      3
    EapolReqFramesTx:        26
    InvalidEapolFramesRx:    0
    EapLengthErrorFramesRx:  0
    LastEapolFrameVersion:   1
    LastEapolFrameSource:    0009:6B13:2389
```

3.3 Nortel Wireless LAN Controller:

The following CLI commands can be issued on the Nortel Wireless LAN 2300 Controller to verify configuration and debug failed 802.1X authentications.

1 **A full list of associated and authenticated clients and VLAN membership can be viewed by issuing the *show sessions* command.**

WSS2350-1# *show sessions*

```
1 sessions total

User Name             SessID  Type  Address           VLAN            AP/Radio
--------------------- ------  ----- ----------------- --------------- --------
ESELAB\wlanuser          503* dot1x 192.168.40.102    USERS1          1/1
```

2 **A full list of 802.1X clients, authentication state and encryption details may be viewed by issuing the *show dot1x clients* command.**

WSS2350-1# *show dot1x clients*

```
   MAC Address        State          Vlan      Identity          cipher
  -------------      -------        ------    ----------        --------
00:16:e3:2b:68:f9 Authenticated   USERS1     ESELAB\wlanuser   TKIP (WPA)
```

```
1 total users
```

3 **The RADIUS server status and server groups may be viewed by issuing the *show radius* command.**

WSS2350-1# *show radius*

```
Radius Servers Default Values
Auth-Port=1812 Acct-Port=1813 Timeout=5 Acct-Timeout=5
Retrans=3 Deadtime=0 Key=(null) Author-Pass=(null)

Radius Servers
                              Auth  Acct  Time        Dead
Server         IP address     Port  Port  Out   Retry Time State
-------------- --------------- ----- ----- ----- ----- ---- -----
NSNAS          192.168.20.11   1812  1813      5     3    0    UP

Server groups
    NSNA: NSNAS
```

4 **The list of configured VLANs, state, 802.1Q tag and port membership may be viewed by issuing the *show vlan* command:**

WSS2350-1# *show vlan*

```
                      Admin  VLAN  Tunl                          Port
VLAN Name             Status State Affin Port              Tag   State
---- ---------------- ------ ----- ----- ---------------- ----- -----
   1 default          Up     Down      5
  10 SERVICES         Up     Up        5
                                         1                    10 Up
  40 USERS1           Up     Up        5
                                         1                    40 Up
```

4. Appendix:

4.1 Stackable Ethernet Switch Return Attributes:

Port Based Priority Attributes			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Port-Priority	562	1	0 – 7 (802.1P Priority)
Remote Management Access			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Service-Type	0	6	6 - Administrator (RW Access)
Service-Type	0	6	7 - NAS-Prompt (RO Access)
Used Based Policies			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
User-Role	562	110	UROL<role-name>
VLAN Attributes			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Tunnel-Type	0	64	13 – (Virtual LANs)
Tunnel-Medium-Type	0	65	6 – (802)
Tunnel-Private-Group-ID	0	81	VLAN-ID which the client belongs

Table 4.1 – Stackable Ethernet Switch RADIUS Attributes

4.2 Modular Ethernet Switch Return Attributes:

Port Based Priority Attributes			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Port-Priority	562	1	0 – 7 (802.1P Priority)
Remote Management Access			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
None-Access	1584	192	0
Read-Only-Access	1584	192	1
L1-Read-Write-Access	1584	192	2
L2-Read-Write-Access	1584	192	3
L3-Read-Write-Access	1584	192	4
Read-Write-Access	1584	192	5
Read-Write-All-Access	1584	192	6
Used Based Policies			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
User-Role	562	110	UROL<role-name>
VLAN Attributes			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Tunnel-Type	0	64	13 – (Virtual LANs)
Tunnel-Medium-Type	0	65	6 – (802)
Tunnel-Private-Group-ID	0	81	VLAN-ID which the client belongs

Table 4.2 – Modular Ethernet Switch RADIUS Attributes

4.3 WLAN 2300 RADIUS Return Attributes:

Remote Management Access			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Service-Type	0	6	2 - Framed (Network User Access)
Service-Type	0	6	6 - Administrative (Enable Mode)
Service-Type	0	6	7 - NAS-Prompt (Non Enable Mode)
Identity Based Networking			
Attribute Name	**Vendor-ID**	**Attribute-ID**	**Value**
Filter-ID	0	11	Name of ACL
VLAN-Name	562	231	Name of the VLAN to which the client belongs
Mobility-Profile	562	232	Name of the Mobility Profile used by the authorized client
Encryption-Type	562	233	Type of encryption used to authenticate the client.
Time-Of-Day	562	234	Day(s) and time(s) during which a user can log into the network.
SSID	562	235	Name of the SSID you want the user to use.
End-Date	562	236	Date and time after which the user is no longer allowed to be on the network
Start-Date	562	237	Date and time at which the user becomes eligible to access the network
URL	562	238	URL to which the user is redirected after successful Web-based AAA

Table 4.3 – WLAN 2300 RADIUS Attributes

4.1 Realms:

Realms provide the ability for the Secure Network Access Server to route an authentication request to a specific authentication server (local, LDAP, NTLM etc) based on the user information contained within the RADIUS access request packet.

When a RADIUS client sends user credentials for authentication, a user name is often included. Within the user name are two elements:

1. Identification of the user account name
2. Identification of the user account location

For example the user name kmarshall@eselab.com includes the account name *kmarshall* and the account location *eselab.com*.

A realm name may be a prefix or suffix depending on the operating system, authentication type and client. Before defining a realm name it's important to understand the formatting of the authentication request to ensure that the authentication request will be processed correctly by the Nortel Secure Network Access Switch.

For example a PEAP authentication request from a Microsoft Windows XP client may include the Windows Domain name as a prefix such as *ESELAB\username*. To authenticate users in this example a realm named *ESELAB* or *eselab* would need to be created.

An EAP-TLS authentication request as well as host authentication will include the realm name in the suffix such as *user@eselab.com* or host/computer*@eselab.com*. To authenticate users in this example a realm named *eselab.com* would need to be created.

Username	Realm Name
kmarshall@eselab.com	eselab.com
host/ibm-t30-1@eselab.com	eselab.com
ESELAB\kmarshall	ESELAB or eselab

Table 4.1 – Example Realms

5. Software Baseline:

The following table provides the individual software releases for each Nortel Ethernet Routing Switch used in this document:

Nortel Platform	Software Release
Nortel Secure Network Access Switch 4050	v2.0.0.55
Nortel Ethernet Routing Switch 5500	v5.1.0.015
Nortel WLAN 2300 Controller	V6.0.7.2
Microsoft Platform	**Software Release**
Windows Server 2003 Enterprise Edition	Service Pack 2
Windows XP Professional	Service Pack 3
Windows Vista Ultimate	Service Pack 1

Table 5.0 – Software Baseline

6. Reference Documentation:

Table 7.0 provides a list of additional Nortel and Microsoft Publications which may be referenced to for additional information:

Nortel Document Title	Location
Nortel Ethernet Routing Switch 5500 Series Configuration - Security (217463-C)	http://www.nortel.com/support
Nortel WLAN Security Switch 2300 Series Configuration Guide (320657-F)	http://www.nortel.com/support
Nortel WLAN Security Switch 2300 Series Command Line Reference (320658-F)	http://www.nortel.com/support

Table 6.0 – Reference Documentation

Contact us

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Nortel Networks service program, contact Nortel Technical Support. To obtain contact information online, go to www.nortel.com/contactus.

From the Technical Support page, you can open a Customer Service Request online or find the telephone number for the nearest Technical Solutions Center. If you are not connected to the Internet, call 1-800-4NORTEL (1-800-466-7835) to learn the telephone number for the nearest Technical Solutions Center.

An Express Routing Code (ERC) is available for many Nortel products and services. When you use an ERC, your call is routed to a technical support person who specializes in supporting that product or service. To locate an ERC for your product or service, go to www.nortel.com/erc.