Engineering Simplicity

Network Configuration Example

Configuring 802.1X PEAP and MAC RADIUS Authentication with EX Series Switches and Aruba ClearPass Policy Manager

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Juniper Networks, Inc.
1133 Innovation Way
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

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Table of Contents

About this guide

This network configuration example describes how you configure a Juniper Networks EX Series Ethernet Switch and Aruba ClearPass Policy Manager to work together to authenticate wired endpoints that connect to EX Series switches. Specifically, it shows how to configure an EX Series switch and Aruba ClearPass for 802.1X Protected Extensible Authentication Protocol (PEAP) authentication and for MAC RADIUS authentication.

1

CHAPTER

Configuring 802.1X PEAP and MAC RADIUS Authentication with EX Series Switches and Aruba ClearPass Policy Manager

About This Network Configuration Example

This network configuration example describes how you configure a Juniper Networks EX Series Ethernet Switch and Aruba ClearPass Policy Manager to work together to authenticate wired endpoints that connect to EX Series switches. Specifically, it shows how to configure an EX Series switch and Aruba ClearPass for 802.1X Protected Extensible Authentication Protocol (PEAP) authentication and for MAC RADIUS authentication.

Use Case Overview

Juniper Networks EX Series Ethernet Switches are designed to meet the demands of today's high-performance businesses. They enable companies to grow their networks at their own pace, minimizing large up-front investments. Based on open standards, EX Series switches provide the carrier-class reliability, security risk management, virtualization, application control, and lower total cost of ownership (TCO) that businesses need today while allowing businesses to scale in an economically sensible way for years to come.

Aruba ClearPass Policy Manager is a policy management platform that provides role-based and device-based network access control (NAC) for any user across any wired, wireless, and VPN infrastructure. Enterprises with Aruba wireless infrastructure typically deploy Aruba ClearPass to provide NAC services for the wireless infrastructure. Enterprises that also deploy EX Series switches in these environments can leverage the extensive RADIUS capabilities on EX Series switches to integrate with Aruba ClearPass. This integration enables enterprises to deploy consistent security policies across their wired and wireless infrastructure.

Enterprises typically have a variety of users and endpoints, which results in multiple use cases that need to be addressed by their policy infrastructure. Depending on the type of endpoint and how it is being used, an endpoint might be authenticated by 802.1X authentication, MAC RADIUS authentication, or captive portal authentication. The policy infrastructure should enable any device to be connected to any port in the access switch and to be authenticated based on the capabilities of the device, the authorization level of the user, or both.

In this network configuration example, we show how to configure a Juniper Networks and Aruba ClearPass policy infrastructure for two use cases: authenticating an employee laptop using 802.1X PEAP authentication and authenticating a guest laptop using MAC RADIUS authentication.

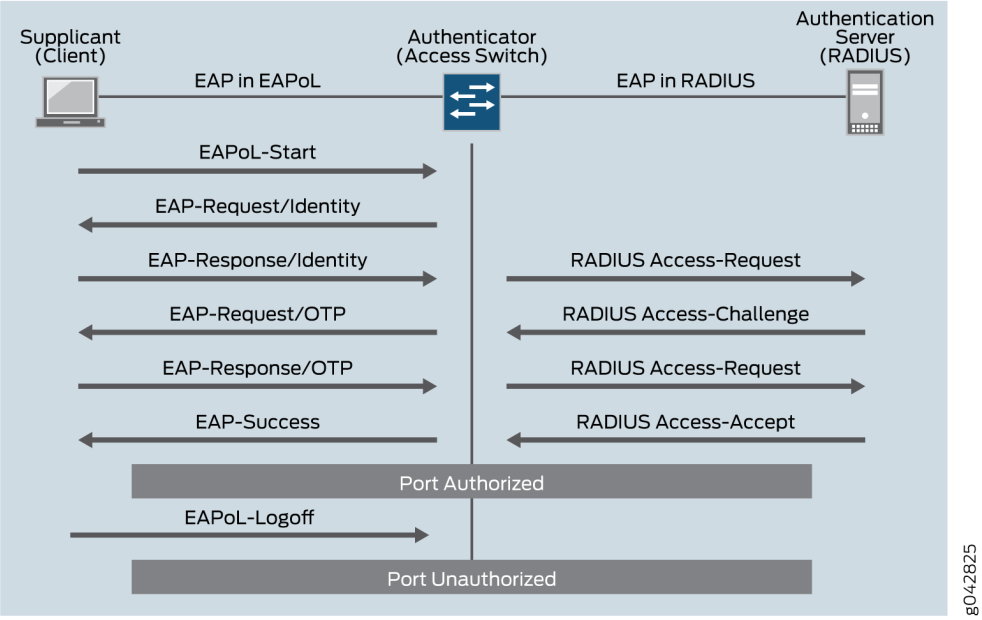
RELATED DOCUMENTATION

Technical Overview

EX Series switches support endpoint access control through the 802.1X port-based network access control standard. When 802.1X authentication is enabled on a port, the switch (known as the authenticator) blocks all traffic to and from the end device (known as a supplicant) until the supplicant's credentials are presented and matched on an authentication server. The authentication server is typically a RADIUS server or a policy manager, such as Aruba ClearPass Policy Manager, that acts as a RADIUS server. After the supplicant is authenticated, the switch opens the port to the supplicant.

Figure 1 on page 4 illustrates the authentication process. The supplicant and authenticator communicate with each other by exchanging Extensible Authentication Protocol over LAN (EAPoL) packets carried by the 802.1X protocol. The authenticator and the RADIUS server communicate by exchanging EAP packets carried by the RADIUS protocol.

Figure 1: 802.1X Authentication Process



The 802.1X protocol supports a number of different versions of the EAP protocol. This configuration example uses PEAP. PEAP encapsulates EAP packets within an encrypted and authenticated Transport Layer Security (TLS) tunnel. Because it sets up the tunnel and is not directly involved with authenticating the endpoints, it is referred to as the outer authentication protocol. PEAP is usually paired with an inner authentication protocol that authenticates the endpoints. The most commonly used inner authentication protocol is Microsoft Challenge Handshake Authentication Protocol version 2 (MS-CHAPv2). MS-CHAPv2 allows authentication to databases that support the MS-CHAPv2 format, such as Microsoft Active Directory.

Not all endpoints use or support an 802.1X supplicant. Endpoints that don't use 802.1X can be authenticated using MAC RADIUS authentication. With MAC RADIUS authentication, the switch passes the MAC address of the endpoint to the RADIUS server, which tries to match the MAC address against a list of MAC addresses in its database. If the endpoint's MAC address matches an address in the list, the endpoint is authenticated.

You can configure both 802.1X and MAC RADIUS authentication methods on the interface. In this case, the switch first attempts to authenticate using 802.1X, and if that method fails, it attempts to authenticate the end device using MAC RADIUS authentication. If you know that only endpoints that are not 802.1X-enabled connect on the interface, you can eliminate the delay that occurs while the switch determines that the end device is not 802.1X-enabled by configuring the `mac-radius restrict` option. When this option is configured, the switch does not attempt to authenticate the endpoint through 802.1X authentication and instead immediately sends a request to the RADIUS server for authentication of the MAC address of the endpoint.

EX Series switches also support dynamic VLANs and firewall filters. As part of the authentication process, a RADIUS server can return IETF-defined attributes to the switch that provide VLAN and firewall filter information. You can, for example, configure a policy manager such as Aruba ClearPass to pass different RADIUS attributes back to the switch based on the policies you have defined for different users, endpoint types, authentication methods, and so forth. The switch dynamically changes the VLAN or firewall filter assigned to the port according to the RADIUS attributes it receives.

RELATED DOCUMENTATION

Example: Configuring 802.1X-PEAP and MAC RADIUS Authentication with EX Series Switches and Aruba ClearPass Policy Manager

IN THIS SECTION

This configuration example illustrates how to:

- Configure an EX Series switch, Aruba ClearPass Policy Manager, and a laptop running Windows 7 for 802.1X PEAP authentication
- Configure an EX Series switch and Aruba ClearPass for MAC RADIUS authentication
- Configure an EX Series switch and Aruba ClearPass to implement dynamic VLANs and firewall filters

Requirements

This example uses the following hardware and software components for the policy infrastructure:

- An EX4300 switch running Junos OS Release 14.1X53-D30 or later
- An Aruba ClearPass Policy Manager platform running 6.3.3.63748 or later
- Laptops running Microsoft Windows 7 Enterprise

Overview and Topology

In this example, the policy infrastructure components are configured to authenticate the following endpoints:

- An employee laptop that is configured for 802.1X PEAP authentication.

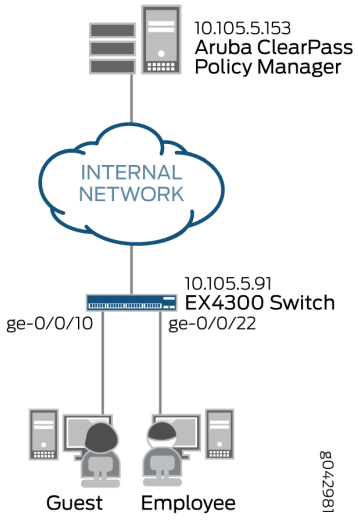
  In the example configuration, Aruba ClearPass Policy Manager is configured to authenticate 802.1X users using its local user database. If the authenticated employee is listed in the database as belonging to the finance department, Aruba ClearPass returns the VLAN ID 201 to the switch in a RADIUS attribute. The switch then dynamically configures the laptop access port to be in VLAN 201.

- A guest laptop that is not configured for 802.1X authentication.

  In this case, the switch detects that the endpoint does not have an 802.1X supplicant. Because MAC RADIUS authentication is also enabled on the interface, the switch then attempts MAC RADIUS authentication. If the laptop MAC address is not in the Aruba ClearPass MAC address database—as would be the case for a guest laptop—Aruba ClearPass is configured to return the name of the firewall filter the switch should enforce on the access port. This firewall filter, which is configured on the switch, allows the guest to access to the entire network except subnet 192.168.0.0/16.

Figure 2 on page 7 shows the topology used in this example.

Figure 2: Topology Used in this Example



Configuration

IN THIS SECTION

This section provides step-by-step instructions for:

Configuring the EX4300 Switch

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them in a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the [edit] hierarchy level, and then enter commit from configuration mode.

```
[edit]
set access radius-server 10.105.5.153 dynamic-request-port 3799
set access radius-server 10.105.5.153 secret password
set access radius-server 10.105.5.153 source-address 10.105.5.91
set access profile Aruba-Test-Profile accounting-order radius
set access profile Aruba-Test-Profile authentication-order radius
set access profile Aruba-Test-Profile radius authentication-server 10.105.5.153
set access profile Aruba-Test-Profile radius accounting-server 10.105.5.153
set access profile Aruba-Test-Profile radius options nas-identifier 10.105.5.153
set protocols dot1x authenticator authentication-profile-name Aruba-Test-Profile
set protocols dot1x authenticator interface ge-0/0/10 mac-radius
set protocols dot1x authenticator interface ge-0/0/22 mac-radius
set protocols dot1x authenticator interface ge-0/0/10 supplicant multiple
set protocols dot1x authenticator interface ge-0/0/22 supplicant multiple
set interfaces ge-0/0/10 unit 0 family ethernet-switching vlan members v201
set interfaces ge-0/0/22 unit 0 family ethernet-switching vlan members v201
set vlans v201 vlan-id 201
set firewall family ethernet-switching filter mac_auth_policy_1 term Block_Internal from ip-
destination-address 192.168.0.0/16
set firewall family ethernet-switching filter mac_auth_policy_1 term Block_Internal then discard
set firewall family ethernet-switching filter mac_auth_policy_1 term Allow_All then accept
```

Step-by-Step Procedure

The general steps to configure an EX4300 switch are:

- Configure the connection to the Aruba ClearPass Policy Manager.
- Create the access profile used by the 802.1X protocol. The access profile tells the 802.1X protocol which authentication server to use and the authentication methods and order.
- Configure the 802.1X protocol.
- Configure Ethernet switching on the ge-0/0/10 and ge-0/0/22 access ports.

- Create the firewall policy to be used when a guest laptop connects to a port.

To configure the EX4300 switch:

1. Provide the RADIUS server connection information.

```
[edit access]
user@Policy-EX4300-01# set radius-server 10.105.5.153 dynamic-request-port 3799
user@Policy-EX4300-01# set radius-server 10.105.5.153 secret password
user@Policy-EX4300-01# set radius-server 10.105.5.153 source-address 10.105.5.91
```

2. Configure the access profile.

```
[edit access]
user@Policy-EX4300-01# set profile Aruba-Test-Profile accounting-order radius
user@Policy-EX4300-01# set profile Aruba-Test-Profile authentication-order radius
user@Policy-EX4300-01# set profile Aruba-Test-Profile radius authentication-server
10.105.5.153
user@Policy-EX4300-01# set profile Aruba-Test-Profile radius accounting-server 10.105.5.153
user@Policy-EX4300-01# set profile Aruba-Test-Profile radius options nas-identifier
10.105.5.153
```

3. Configure the 802.1X protocol to use Aruba-Test-Profile and to run on each access interface. In addition, configure the interfaces to use MAC RADIUS authentication and to allow more than one supplicant, each of which must be individually authenticated.

```
[edit protocols]
user@Policy-EX4300-01# set dot1x authenticator authentication-profile-name Aruba-Test-Profile
user@Policy-EX4300-01# set dot1x authenticator interface ge-0/0/10 mac-radius

user@Policy-EX4300-01# set dot1x authenticator interface ge-0/0/22 mac-radius

user@Policy-EX4300-01# set dot1x authenticator interface ge-0/0/10 supplicant multiple
user@Policy-EX4300-01# set dot1x authenticator interface ge-0/0/22 supplicant multiple
```

4. Configure the access ports.

```
[edit interfaces]
user@Policy-EX4300-01# set ge-0/0/10 unit 0 family ethernet-switching vlan members v201
user@Policy-EX4300-01# set ge-0/0/22 unit 0 family ethernet-switching vlan members v201
```

5. Configure VLAN 201, which is used for employees that are members of the Finance department.

```
[edit]
user@Policy-EX4300-01# set vlans v201 vlan-id 201
```

Note that for dynamic VLAN assignment to work, the VLAN must exist on the switch before authentication is attempted. If the VLAN doesn't exist, authentication fails.

6. Configure the firewall filter to be used when a guest laptop connects to a port.

```
[edit firewall]
user@Policy-EX4300-01# set family ethernet-switching filter mac_auth_policy_1 term
Block_Internal from ip-destination-address 192.168.0.0/16
user@Policy-EX4300-01# set family ethernet-switching filter mac_auth_policy_1 term
Block_Internal then discard
user@Policy-EX4300-01# set family ethernet-switching filter mac_auth_policy_1 term Allow_All
then accept
```

Results

From configuration mode, confirm your configuration by entering the following `show` commands.

```
user@Policy-EX4300-01# show access
radius-server {
    10.105.5.153 {
        dynamic-request-port 3799;
        secret "$9$FYxf3A0Ehrv87yl7Vs4DjfTz3Ct0BIcre"; ## SECRET-DATA
        source-address 10.105.5.91;
    }
}
profile Aruba-Test-Profile {
    accounting-order radius;
    authentication-order radius;
```

```
    radius {
        authentication-server 10.105.5.153;
        accounting-server 10.105.5.153;
        options {
            nas-identifier 10.105.5.153;
        }
    }
}
```

```
user@Policy-EX4300-01# show protocols
dot1x {
    authenticator {
        authentication-profile-name Aruba-Test-Profile;
        interface {
            ge-0/0/10.0 {
                supplicant multiple;
                mac-radius;
            }
            ge-0/0/22.0 {
                supplicant multiple;
                mac-radius;
            }
        }
    }
}
```

```
user@Policy-EX4300-01# show interfaces
ge-0/0/10 {
    unit 0 {
        family ethernet-switching {
            vlan {
                members v201;
            }
        }
    }
}
ge-0/0/22 {
    unit 0 {
        family ethernet-switching;
            vlan {
```

```
                members v201;
            }
        }
    }
}
```

```
user@Policy-EX4300-01# show
vlans
v201
{

    vlan-id
201;

}
```

```
user@Policy-EX4300-01# show firewall
family ethernet-switching {
    filter mac_auth_policy_1 {
        term Block_Internal {
            from {
                ip-destination-address {
                    192.168.0.0/16;
                }
            }
            then discard;
        }
        term Allow_All {
            then accept;
        }
    }
}
```

If you are done configuring the device, enter `commit` from configuration mode.

Configuring Aruba ClearPass Policy Manager

Step-by-Step Procedure

The general steps for configuring Aruba ClearPass are:

- Add the Juniper Networks RADIUS dictionary file.
- Add the EX4300 as a network device.
- Ensure that the server certificate used for 802.1X PEAP authentication has been installed.
- Add the local user used in this example and assign the user to the Finance group.
- Create two enforcement profiles:
  - A profile that defines the RADIUS attributes for the dynamic firewall filter.
  - A profile that defines the RADIUS attributes for the dynamic VLAN.
- Create two enforcement policies:
  - A policy that is invoked when MAC RADIUS authentication is used.
  - A policy that is invoked when 802.1X authentication is used.
- Define the MAC RADIUS authentication service and the 802.1X authentication service.
- Ensure that the MAC RADIUS authentication service is evaluated before the 802.1X authentication service.

To configure Aruba ClearPass:

1. Add the Juniper Networks RADIUS dictionary file.

   Step-by-Step Procedure

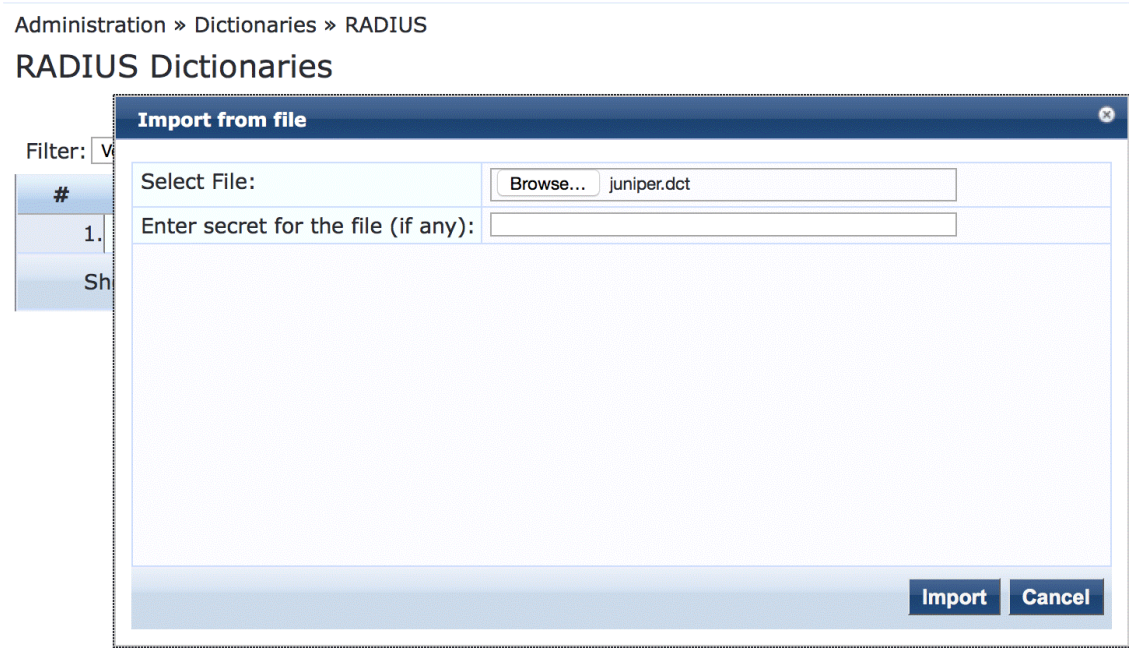
   a. Copy the following contents to a file named **Juniper.dct** on your desktop.

```
##############################################################################
# Juniper.dct - Radius dictionary for JUNOS devices

# (See README.DCT for more details on the format of this file)
##############################################################################
# Use the Radius specification attributes
```

```
#
@radius.dct

#
# Juniper specific parameters
#
MACRO Juniper-VSA(t,s) 26 [vid=2636 type1=%t% len1=+2 data=%s%]

ATTRIBUTE Juniper-Local-User-Name               Juniper-VSA(1,  string)  r
ATTRIBUTE Juniper-Allow-Commands                Juniper-VSA(2,  string)  r
ATTRIBUTE Juniper-Deny-Commands                 Juniper-VSA(3,  string)  r
ATTRIBUTE Juniper-Allow-Configuration           Juniper-VSA(4,  string)  r
ATTRIBUTE Juniper-Deny-Configuration            Juniper-VSA(5,  string)  r

ATTRIBUTE Juniper-Interactive-Command           Juniper-VSA(8,  string)  r
ATTRIBUTE Juniper-Configuration-Change          Juniper-VSA(9,  string)  r
ATTRIBUTE Juniper-User-Permissions              Juniper-VSA(10, string)  r
ATTRIBUTE Juniper-CTP-Group                     Juniper-VSA(21, integer) r
VALUE Juniper-CTP-Group Read_Only 1
VALUE Juniper-CTP-Group Admin 2
VALUE Juniper-CTP-Group Privileged_Admin 3
VALUE Juniper-CTP-Group Auditor 4
ATTRIBUTE Juniper-CTPView-APP-Group             Juniper-VSA(22,integer) r
VALUE Juniper-CTPView-APP-Group Net_View 1
VALUE Juniper-CTPView-APP-Group Net_Admin 2
VALUE Juniper-CTPView-APP-Group Global_Admin 3
ATTRIBUTE Juniper-CTPView-OS-Group              Juniper-VSA(23, integer) r
VALUE Juniper-CTPView-OS-Group Web_Manager 1
VALUE Juniper-CTPView-OS-Group System_Admin 2
VALUE Juniper-CTPView-OS-Group Auditor 3

ATTRIBUTE Juniper-Primary-Dns                   Juniper-VSA(31, ipaddr)  r
ATTRIBUTE Juniper-Primary-Wins                  Juniper-VSA(32, ipaddr)  r
ATTRIBUTE Juniper-Secondary-Dns                 Juniper-VSA(33, ipaddr)  r
ATTRIBUTE Juniper-Secondary-Wins                Juniper-VSA(34, ipaddr)  r
ATTRIBUTE Juniper-Interface-id                  Juniper-VSA(35, string)  r
ATTRIBUTE Juniper-Ip-Pool-Name                  Juniper-VSA(36, string)  r
ATTRIBUTE Juniper-Keep-Alive                    Juniper-VSA(37, integer) r
ATTRIBUTE Juniper-CoS-Traffic-Control-Profile   Juniper-VSA(38, string)  r
ATTRIBUTE Juniper-CoS-Parameter                 Juniper-VSA(39, string)  r
ATTRIBUTE Juniper-encapsulation-overhead        Juniper-VSA(40, integer) r
ATTRIBUTE Juniper-cell-overhead                 Juniper-VSA(41, integer) r
ATTRIBUTE Juniper-tx-connect-speed              Juniper-VSA(42, integer) r
```

```
ATTRIBUTE Juniper-rx-connect-speed              Juniper-VSA(43, integer) r
ATTRIBUTE Juniper-Firewall-filter-name          Juniper-VSA(44, string)  r
ATTRIBUTE Juniper-Policer-Parameter             Juniper-VSA(45, string)  r
ATTRIBUTE Juniper-Local-Group-Name              Juniper-VSA(46, string)  r
ATTRIBUTE Juniper-Local-Interface               Juniper-VSA(47, string)  r
ATTRIBUTE Juniper-Switching-Filter              Juniper-VSA(48, string)  r
ATTRIBUTE Juniper-VoIP-Vlan                     Juniper-VSA(49, string)  r


##############################################################################
# Juniper.dct - Juniper Networks dictionary
##############################################################################
```

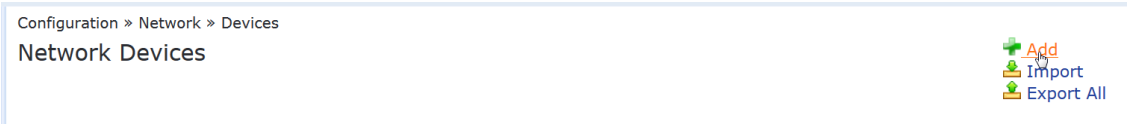
b. In Aruba ClearPass, navigate to Administration > Dictionaries > RADIUS and click on **Import** to import the **Juniper.dct** file.



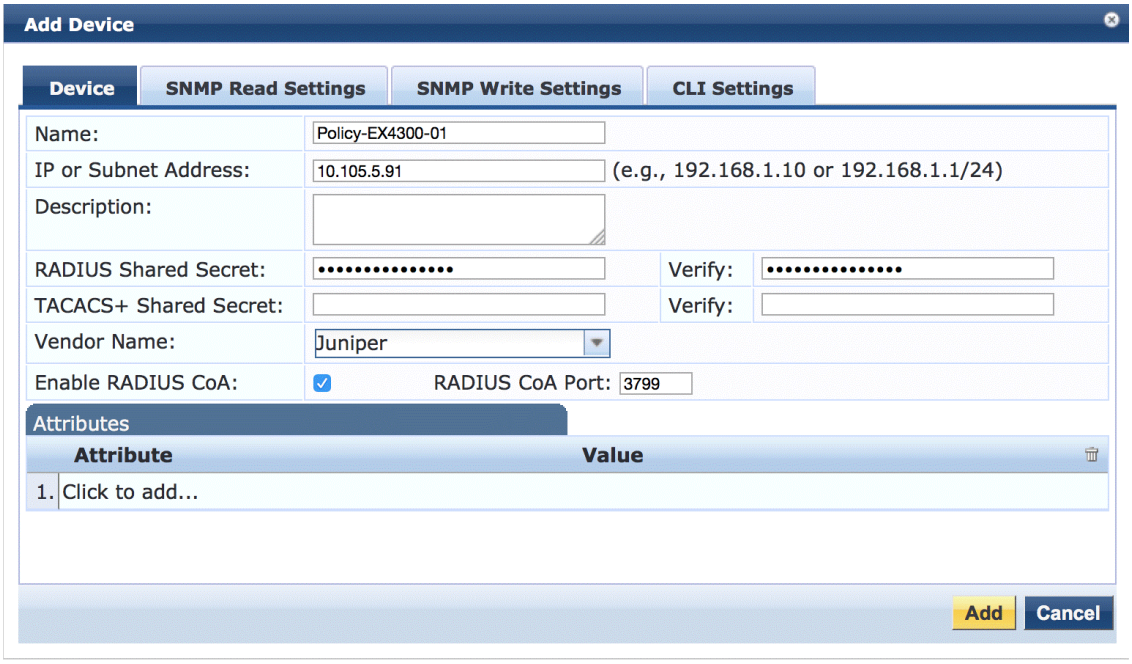
2. Add the EX4300 switch as a network device.

Step-by-Step Procedure

a. Under Configuration > Network > Devices, click **Add**.

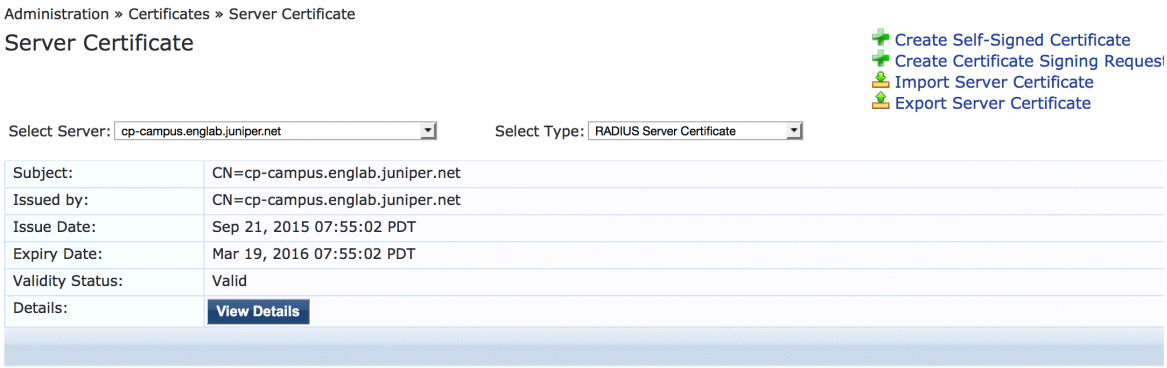


b. On the Device tab, enter the hostname and IP address of the switch and the RADIUS shared secret that you configured on the switch. Set the Vendor Name field to **Juniper**.



3. Ensure that a server certificate for 802.1X PEAP authentication exists.

   Under Administration > Certificates > Server Certificate, verify that Aruba ClearPass has a valid server certificate installed. If it does not, add a valid server certificate. The Aruba ClearPass documentation and your Certificate Authority can provide more details on how to obtain certificates and import them into ClearPass.



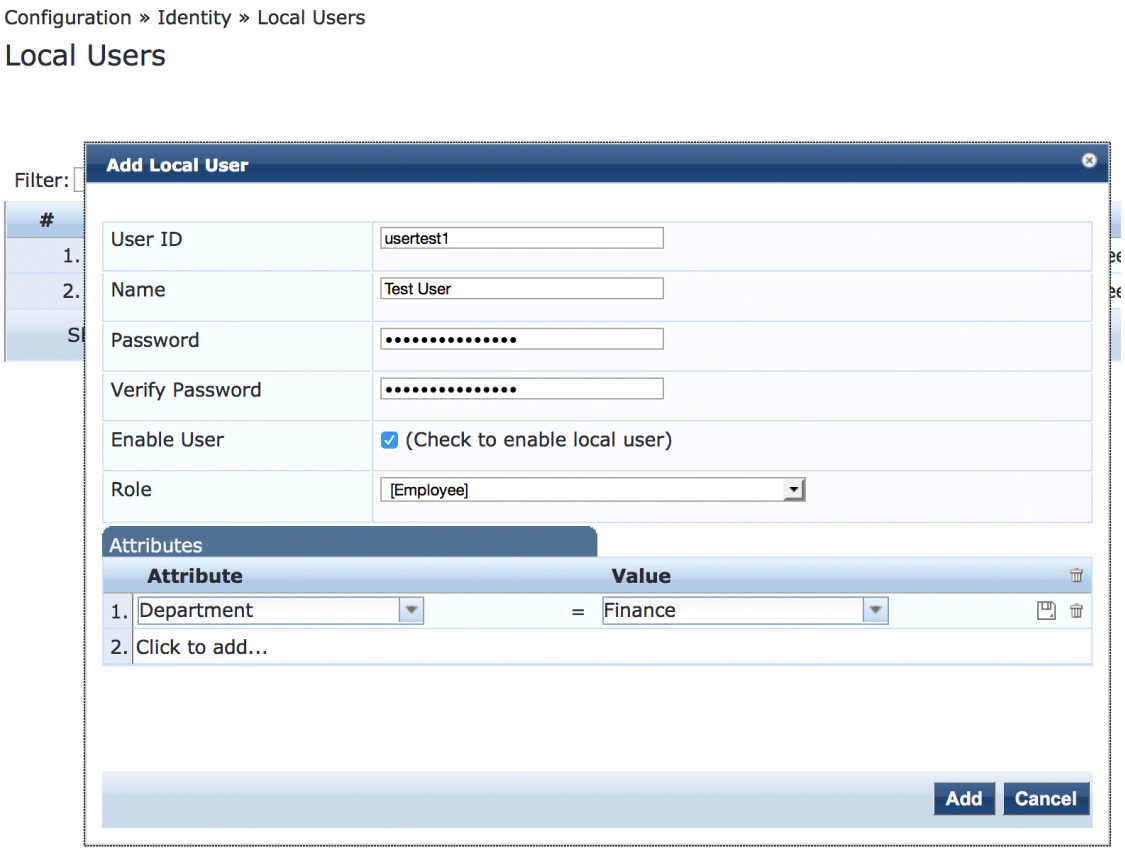
4. Add a test user to the local user repository.

This user will be used to verify 802.1X authentication.

Step-by-Step Procedure

a. Under Configuration -> Identity -> Local Users, click **Add**.

b. In the Add Local User window, enter the user ID (usertest1), user name (Test User), password, and select **Employee** as the user role. Under Attributes, select the **Department** attribute and type **Finance** under Value.



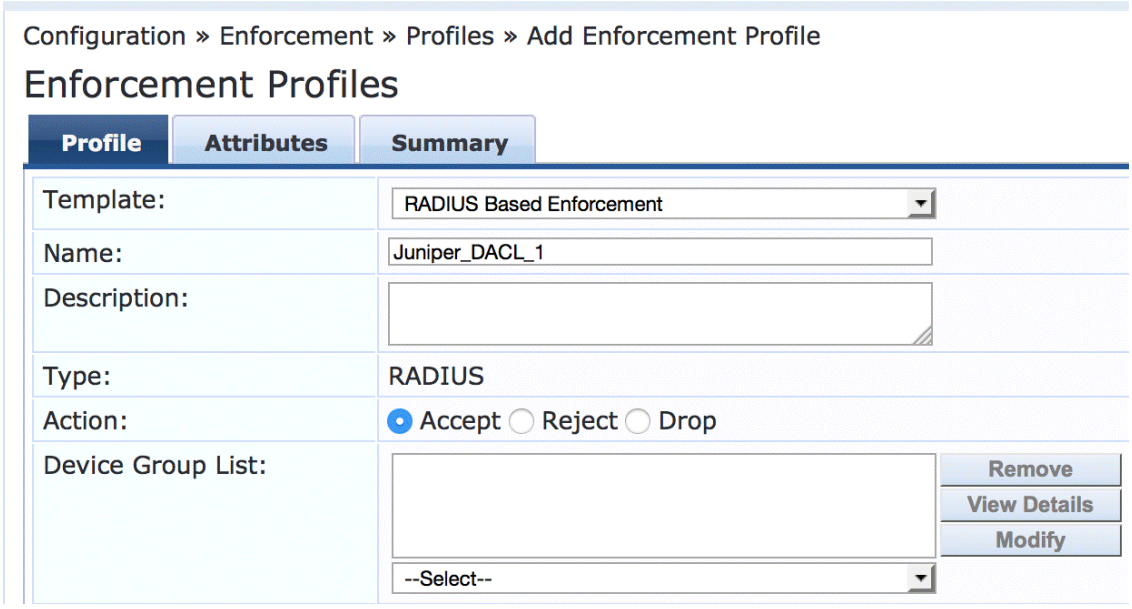
5. Configure a dynamic filter enforcement profile.

This profile defines the RADIUS filter ID attribute, assigning to it the name of the firewall filter you configured on the switch. The attribute is sent to the switch when the endpoint's MAC address is not in the MAC database, enabling the switch to dynamically assign the firewall filter to the access port.

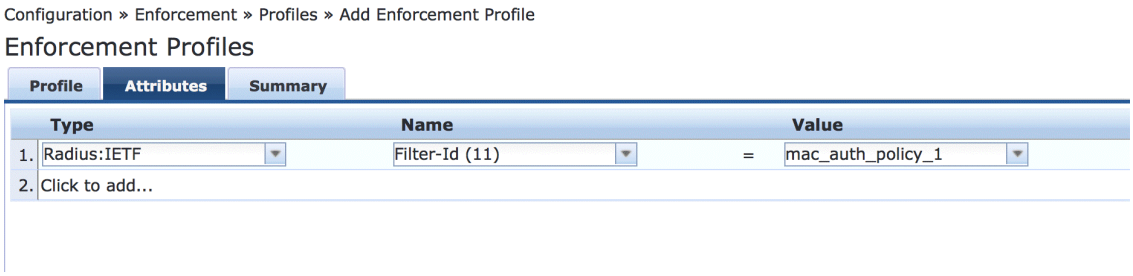
Step-by-Step Procedure

a. Under Configuration > Enforcement > Profiles, click **Add**.

b. On the Profile tab, set Template to **RADIUS Based Enforcement** and type the profile name, **Juniper_DACL_1**, in Name field.



c. On the Attributes tab, set Type to **Radius:IETF**, Name to **Filter-Id (11)**, and type the name of firewall filter, **mac_auth_policy_1**, in the Value field.



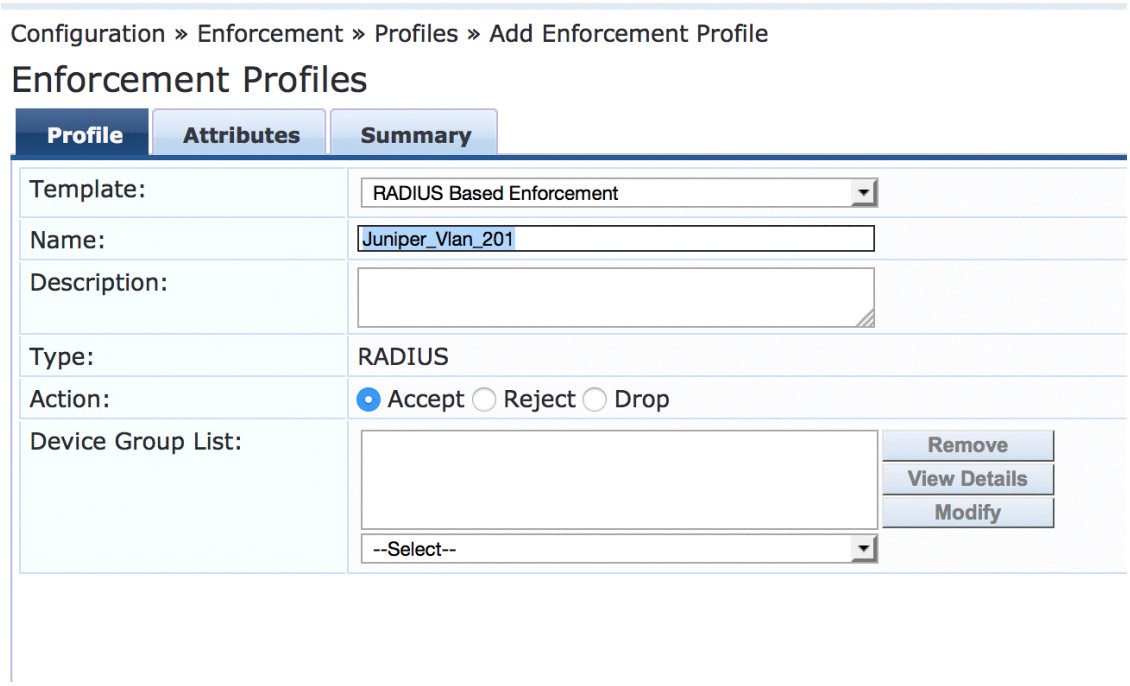
6. Configure a dynamic VLAN enforcement profile.

This profile defines the RADIUS attributes for specifying VLAN 201. These RADIUS attributes are sent to the switch when a user who belongs to the Finance department authenticates using 802.1X, enabling the switch to dynamically assign VLAN 201 to the access port.

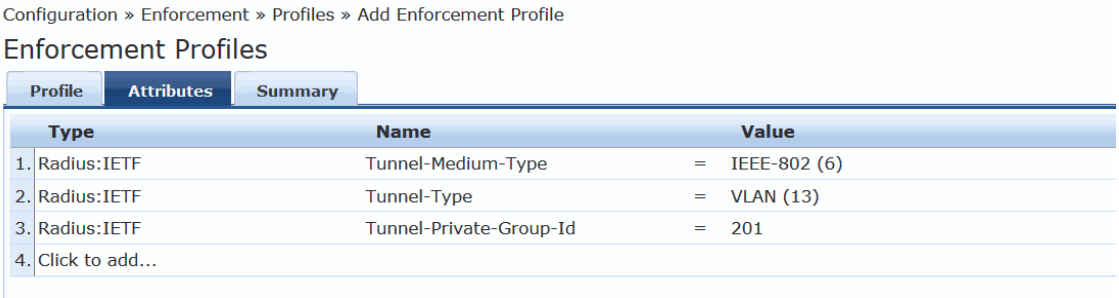
Step-by-Step Procedure

a. Under Configuration > Enforcement > Profiles, click **Add**.

b. On the Profile tab, set Template to **RADIUS Based Enforcement** and type the name of the profile, **Juniper_Vlan_201**, in the Name field.



c. On the Attributes tab, define the RADIUS attributes as shown.



7. Configure the MAC RADIUS authentication enforcement policy.

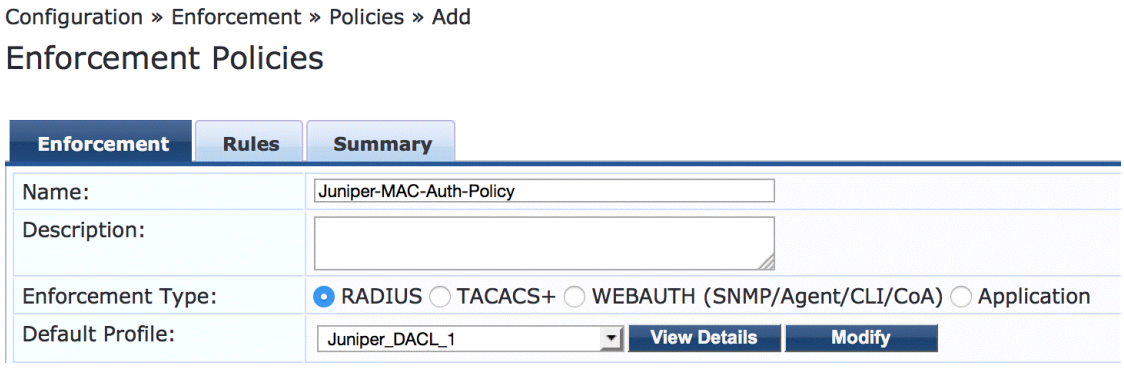
This policy tells Aruba ClearPass to take one of the following actions, depending on whether the endpoint's MAC address is in the RADIUS database:

- If the address is in the RADIUS database, send an Access Accept message to the switch.
- If the address is not in the RADIUS database, send an Acess Accept message to the switch along with the name of the firewall filter defined in the MAC RADIUS authentication profile.

Step-by-Step Procedure

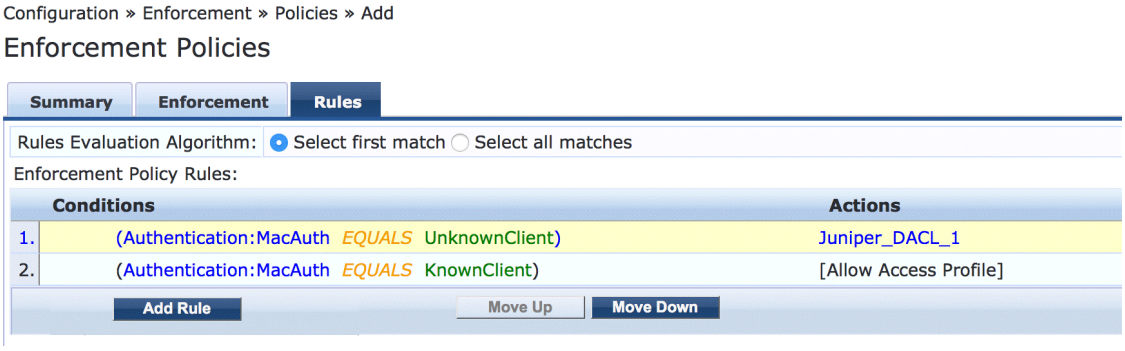
a. Under Configuration > Enforcement > Policies, click **Add**.

b. On the Enforcement tab, type the name of policy (Juniper-MAC-Auth-Policy) and set Default Profile to **Juniper_DACL_1** (the profile you defined in Step "5" on page 17.)



c. On the Rules tab, click **Add Rule** and add the two rules shown.

You must add the rules sequentially by creating the first rule in the Rules Editor and clicking Save before you create the second rule.



8. Configure the 802.1X enforcement policy.

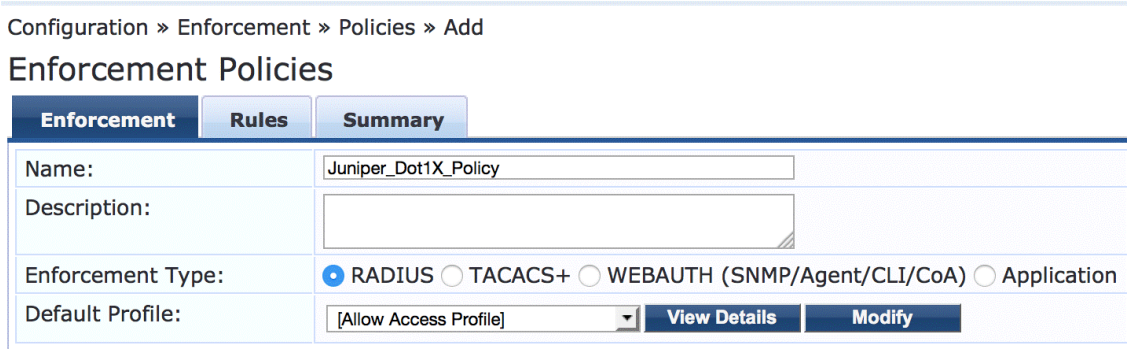
This policy tells Aruba ClearPass to take one of the following actions, depending on whether the user belongs to the Finance department or not:

- If the user belongs to the Finance department, send an Access Accept message to the switch and the VLAN 201 information defined in the 802.1X enforcement profile.
- If the user does not belong to Finance department, send an Access Accept message to the switch.

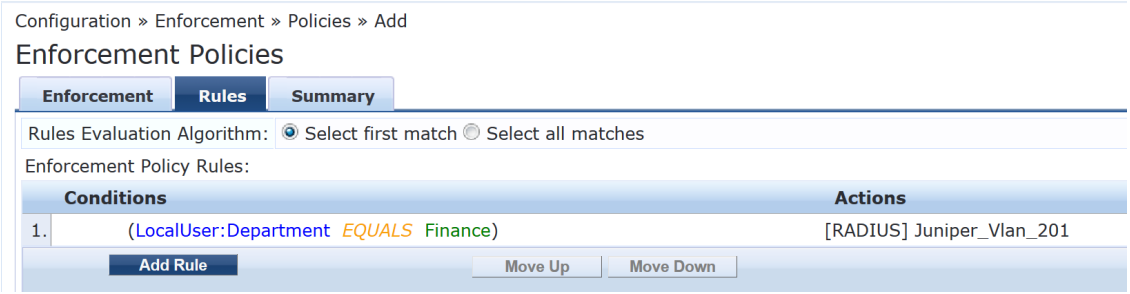
Step-by-Step Procedure

a. Under Configuration > Enforcement > Policies, click **Add**.

b. On the Enforcement tab, type the name of policy (Juniper_Dot1X_Policy) and set Default Profile to **[Allow Access Profile]**. (This is a prepackaged profile that comes with Aruba ClearPass.)



c. On the Rules tab, click **Add Rule** and add the rule shown.



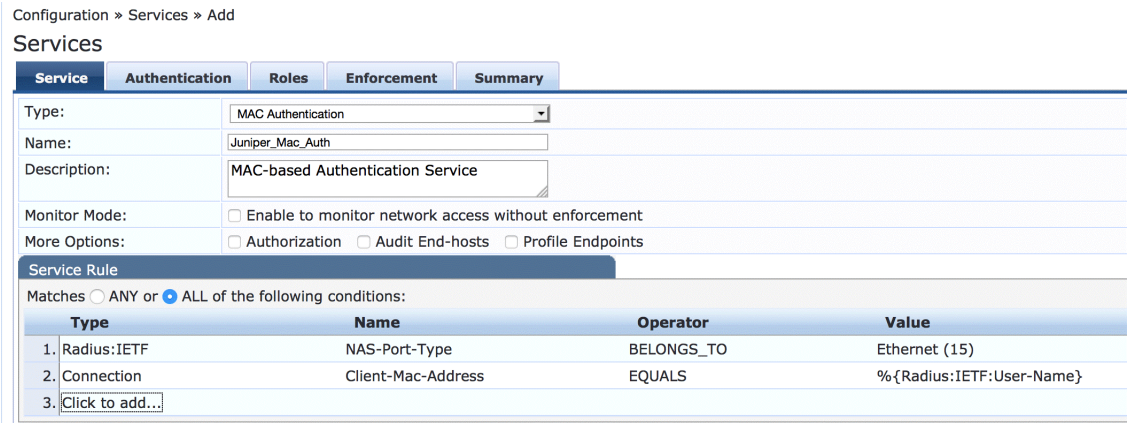
9. Configure the MAC RADIUS authentication service.

The configuration for this service results in MAC RADIUS authentication being performed when the RADIUS User-Name attribute and the Client-MAC-Address attribute received have the same value.

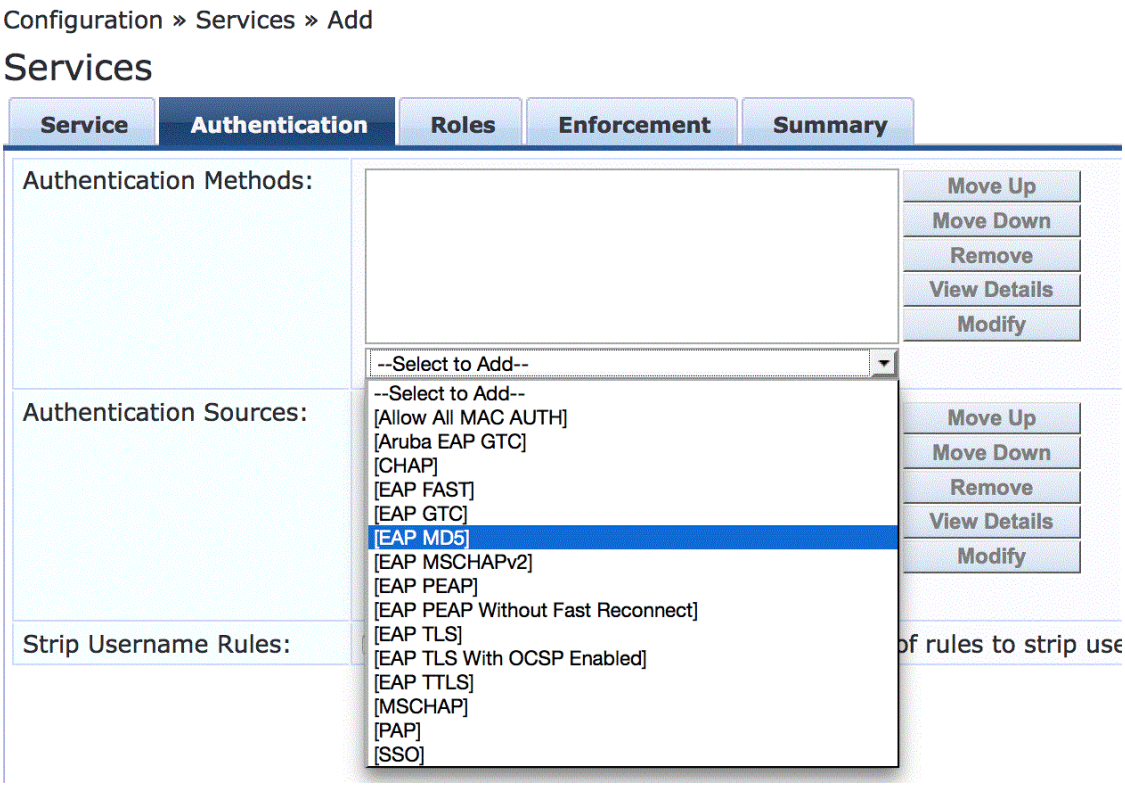
Step-by-Step Procedure

a. Under Configuration > Services, click **Add**.

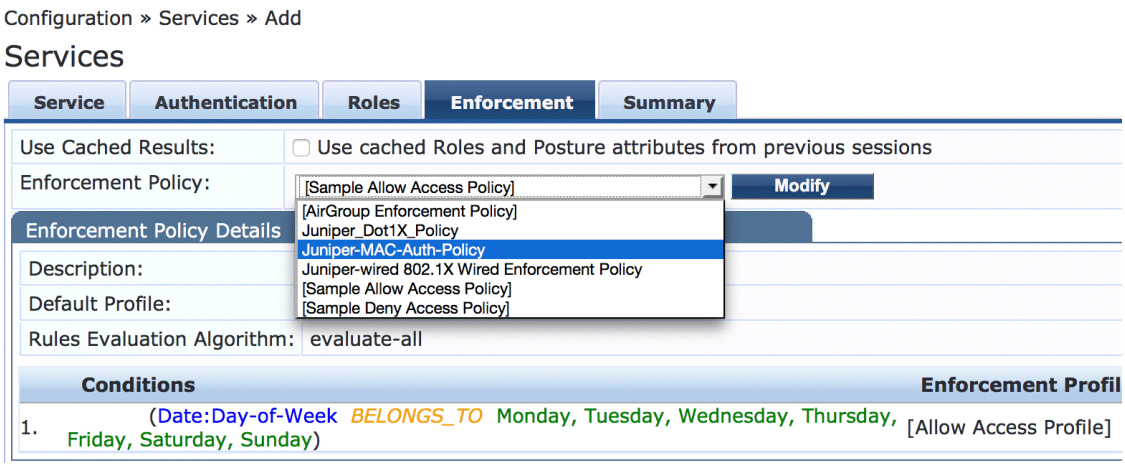
b. On the Services tab, fill out the fields as shown.



c. On the Authentication tab, remove **[MAC AUTH]** from the Authentication Methods list and add **[EAP MD5]** to the list.



d. On the Enforcement tab, select **Juniper-MAC-Auth-Policy**.

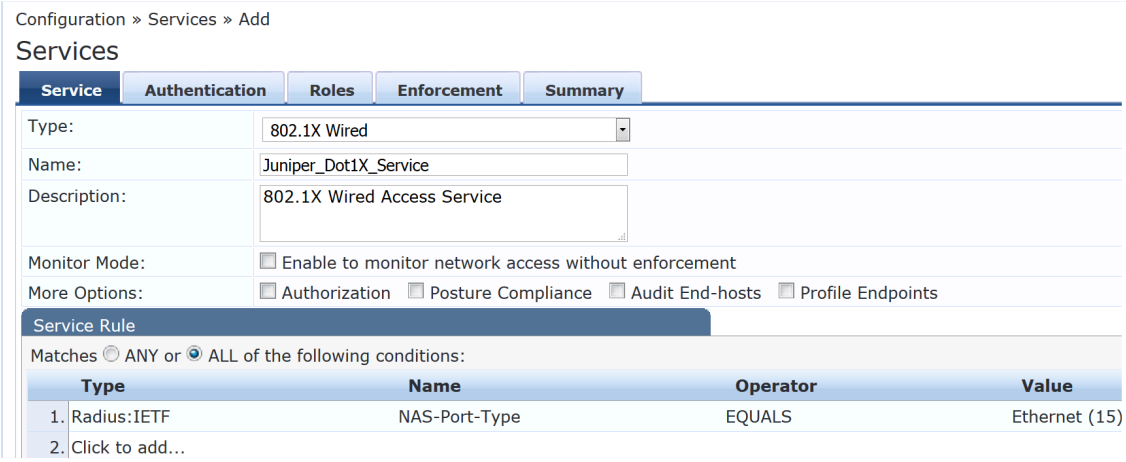


10. Configure the 802.1X authentication service.

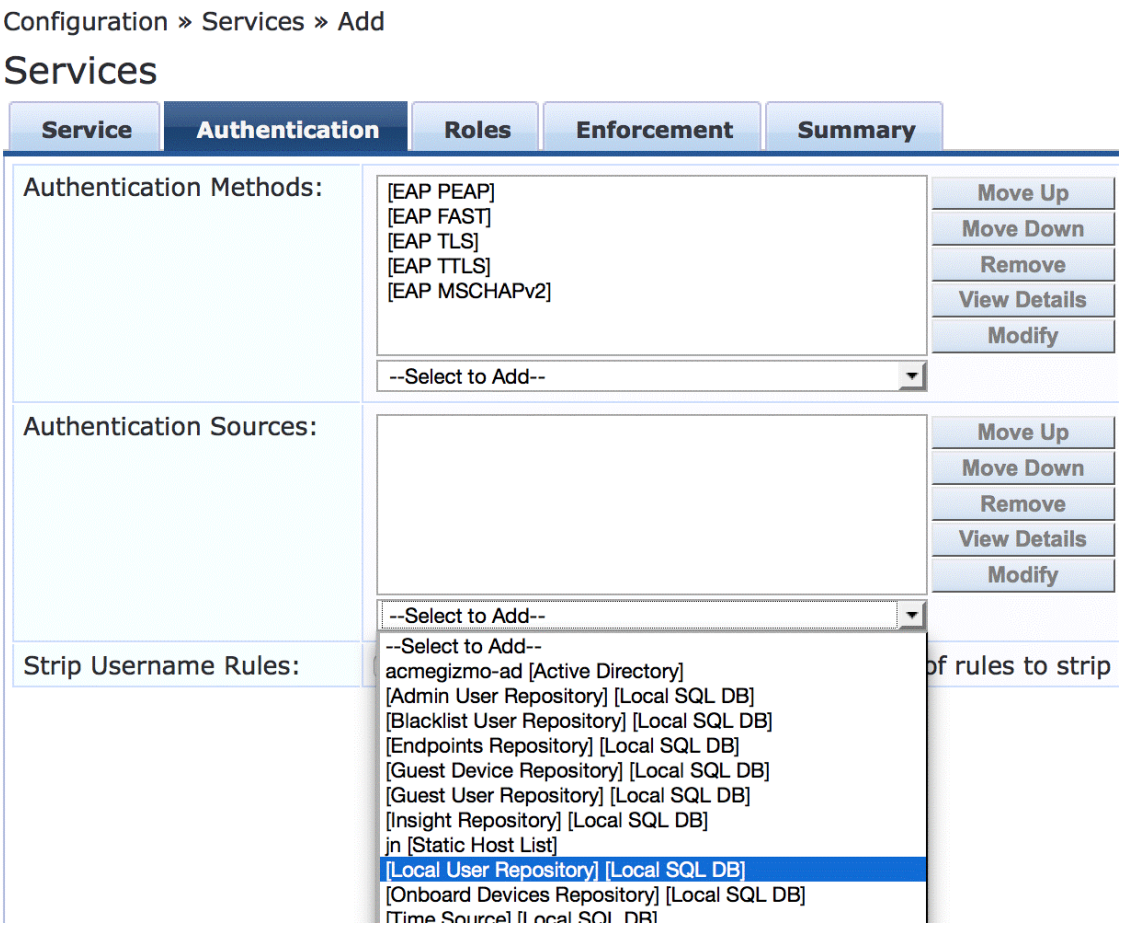
Step-by-Step Procedure

a. Under Configuration > Services, click **Add**.

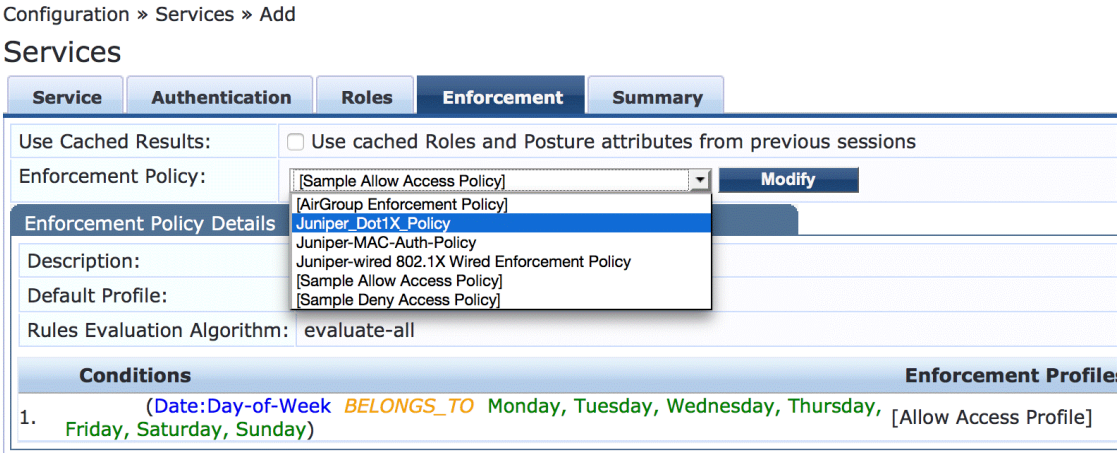
b. On the Service tab, fill out the fields as shown.



c. On the Authentication tab, set Authentication Sources to **[Local User Repository][Local SQL DB]**.



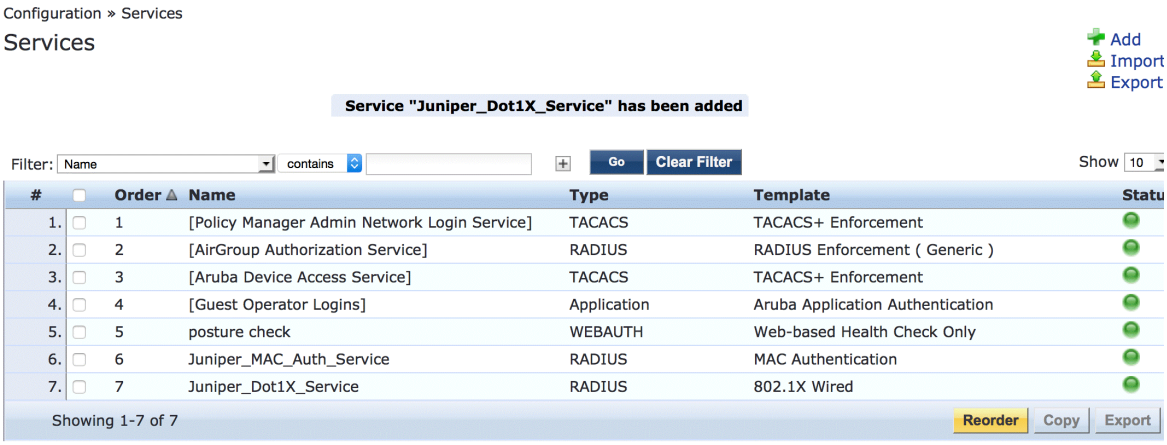
d. On the Enforcement tab, set Enforcement Policy to **Juniper_Dot1X_Policy**.



11. Verify that the MAC RADIUS authentication service policy is evaluated before the 802.1X authentication service policy.

Because Aruba ClearPass is configured to recognize MAC RADIUS authentication requests by the RADIUS User-Name attribute and the Client-MAC-Address attribute having the same value, it is more efficient to have the MAC RADIUS service policy evaluated first.

In the Services main window, verify that **Juniper-MAC-Auth-Policy** appears before **Juniper-MAC_Dot1X_Policy** in the services list, as shown. If it does not, click **Reorder** and move **Juniper-MAC-Auth-Policy** above **Juniper-MAC_Dot1X_Policy**.



#	Order	Name	Type	Template	Statu
1.	1	[Policy Manager Admin Network Login Service]	TACACS	TACACS+ Enforcement	
2.	2	[AirGroup Authorization Service]	RADIUS	RADIUS Enforcement (Generic)	
3.	3	[Aruba Device Access Service]	TACACS	TACACS+ Enforcement	
4.	4	[Guest Operator Logins]	Application	Aruba Application Authentication	
5.	5	posture check	WEBAUTH	Web-based Health Check Only	
6.	6	Juniper_MAC_Auth_Service	RADIUS	MAC Authentication	
7.	7	Juniper_Dot1X_Service	RADIUS	802.1X Wired	

Configuring the Windows 7 Supplicant on the Laptop

Step-by-Step Procedure

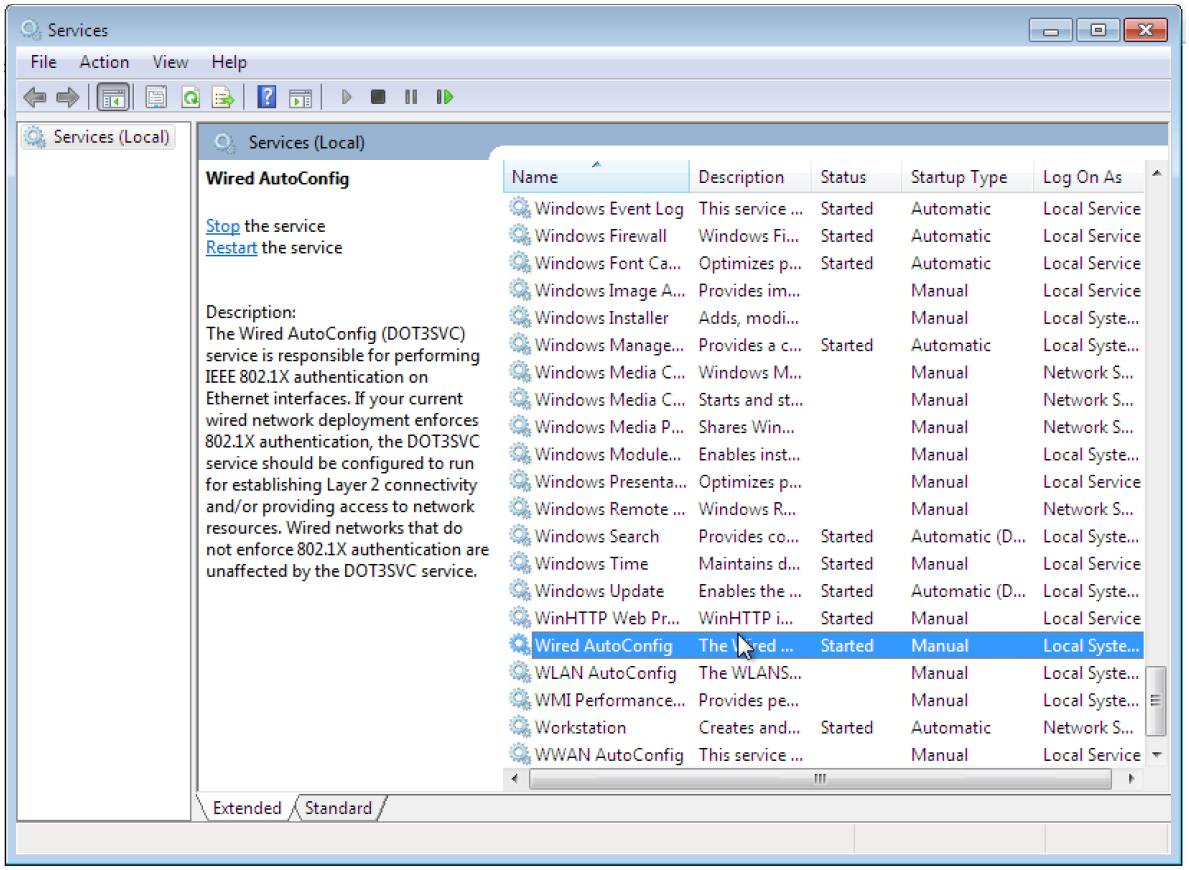
This network configuration example uses the native 802.1X supplicant on the Windows 7 laptop. This supplicant must be configured for 802.1X PEAP authentication.

The general steps for configuring the Windows 7 supplicant are:

- Ensure that the Wired AutoConfig service is started.
- Enable 802.1X PEAP authentication for the Local Area Connection.
- Configure the settings for server certificate validation.
- Configure the user credential settings.

1. Ensure that the Wired AutoConfig service is started on the laptop.

   Select Control Panel > Administrative Tools > Services. **Started** should appear in the Wired AutoConfig Status field.

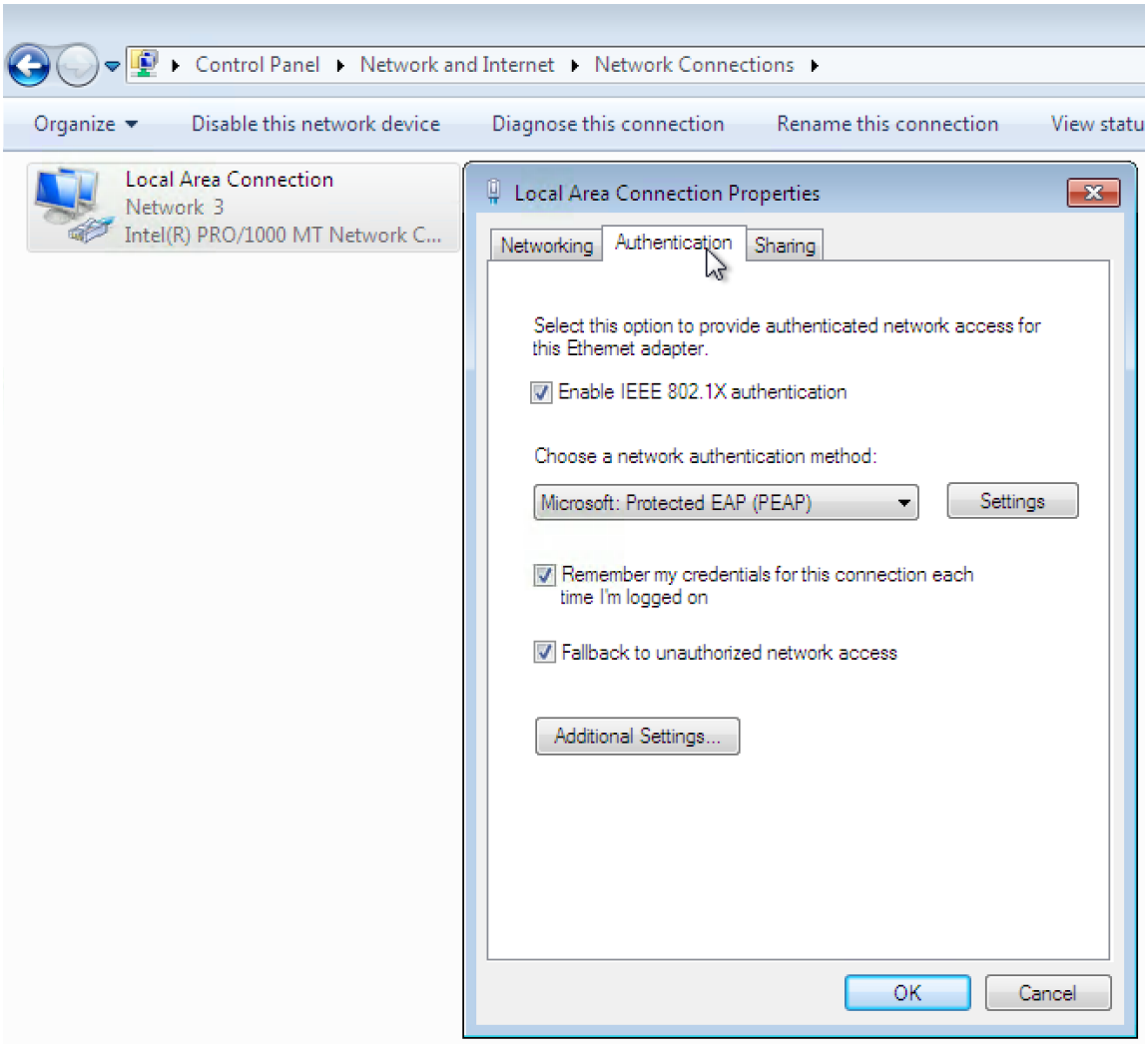


2. Enable 802.1X PEAP authentication for the Local Area Connection.

Step-by-Step Procedure

a. Under Control Panel > Network and Sharing Center > Change Adaptor Settings, right-click **Local Area Connection** and then click **Properties**.

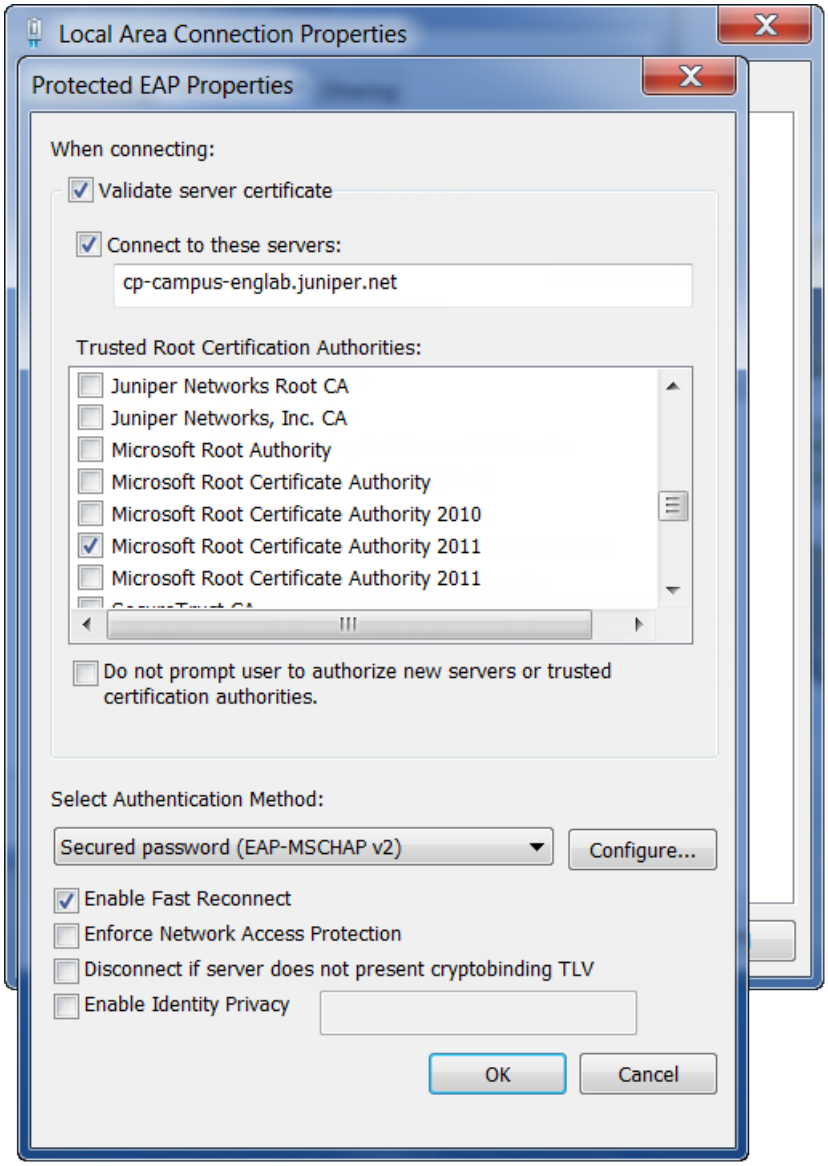
b. On the Authentication tab of the Local Area Connection Properties window, configure the properties as shown.



3. Configure whether or not the laptop validates the Aruba ClearPass server certificate.

   Click **Settings** to display the Protected EAP Properties window.

   - If you do not want the laptop to validate the ClearPass server certificate, uncheck **Validate server certificate.**
   - If you do want the laptop to validate the ClearPass server certificate, check **Validate server certificate**, type the name of the ClearPass server, and select the trusted root certificate authority for the ClearPass server certificate. The server name must match the CN in the server certificate.



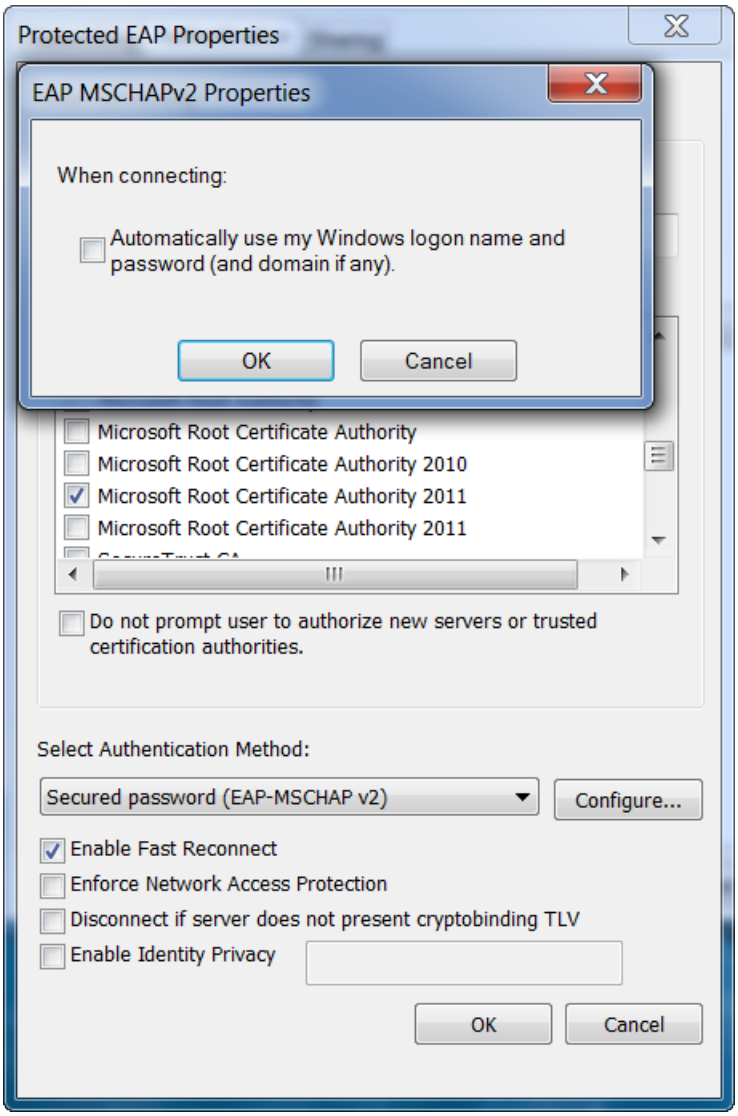
4. Configure the user credentials settings.

   This configuration example does not use the Windows Active Directory credentials for user authentication. Instead, it uses the credentials of the local user defined on the Aruba ClearPass server.

   Step-by-Step Procedure

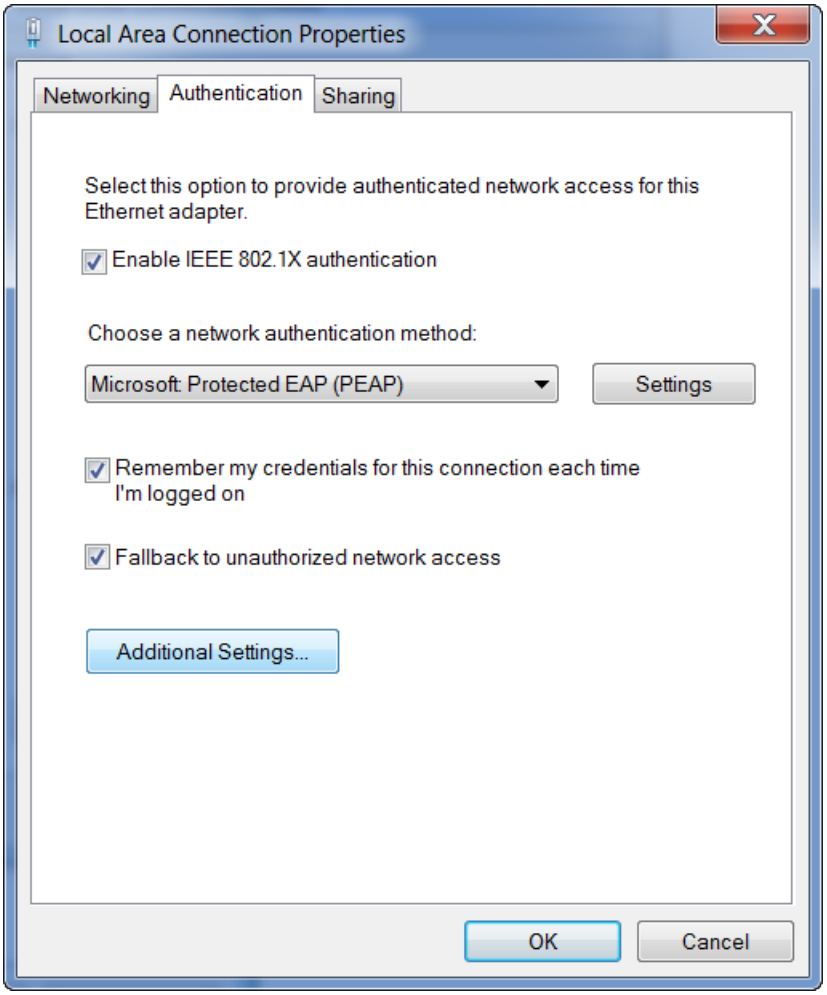
   a. In the Protected EAP Properties window, click **Configure** to configure Secured password (EAP-MSCHAP v2). Clear the **Automatically use my Windows logon name and password** check box.

If your Aurba ClearPass server were configured to use Windows Active Directory to authenticate users, you would leave this option selected.

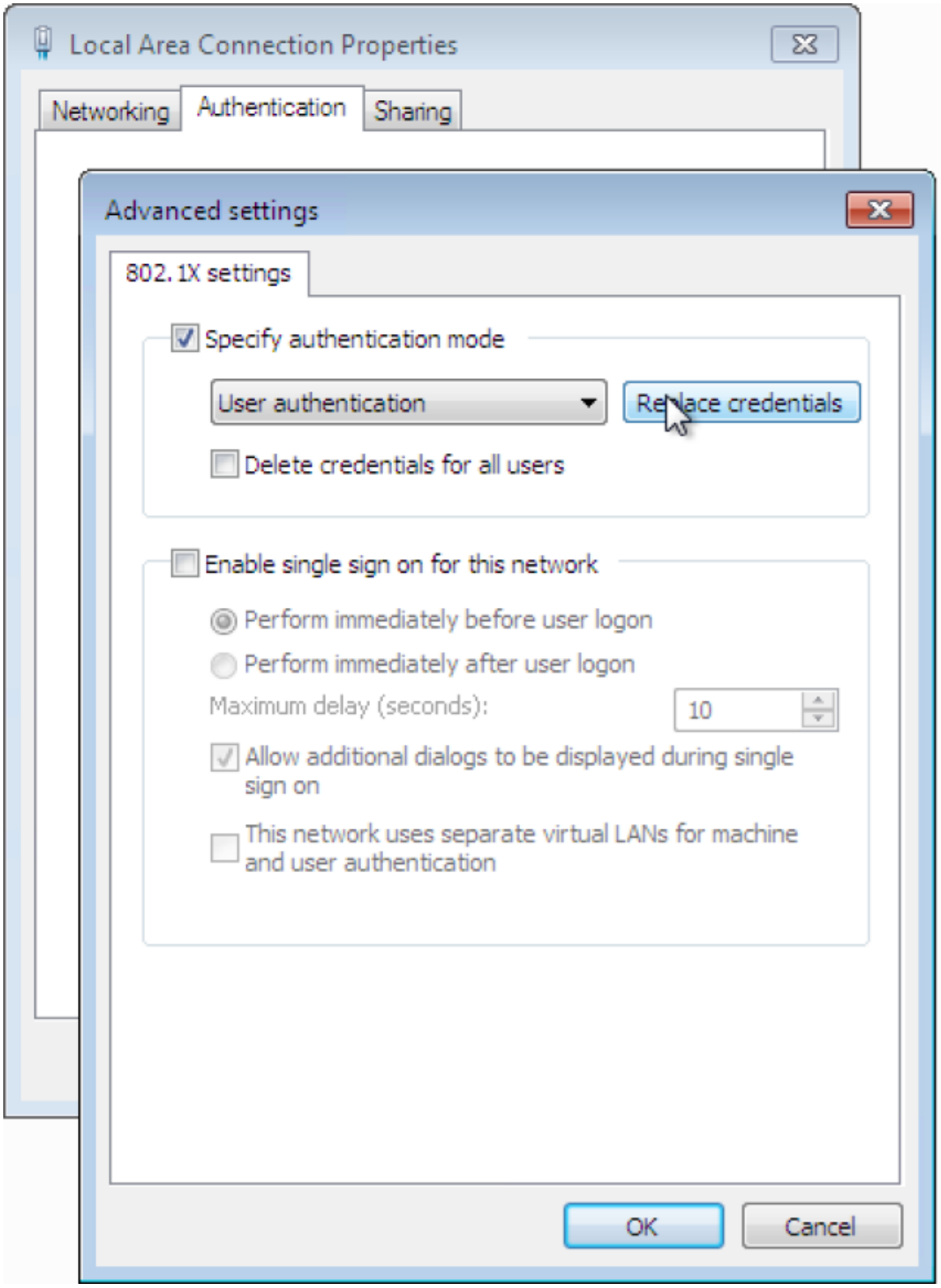


b. Finish configuring the Protected PEAP Properties by clicking **OK**.

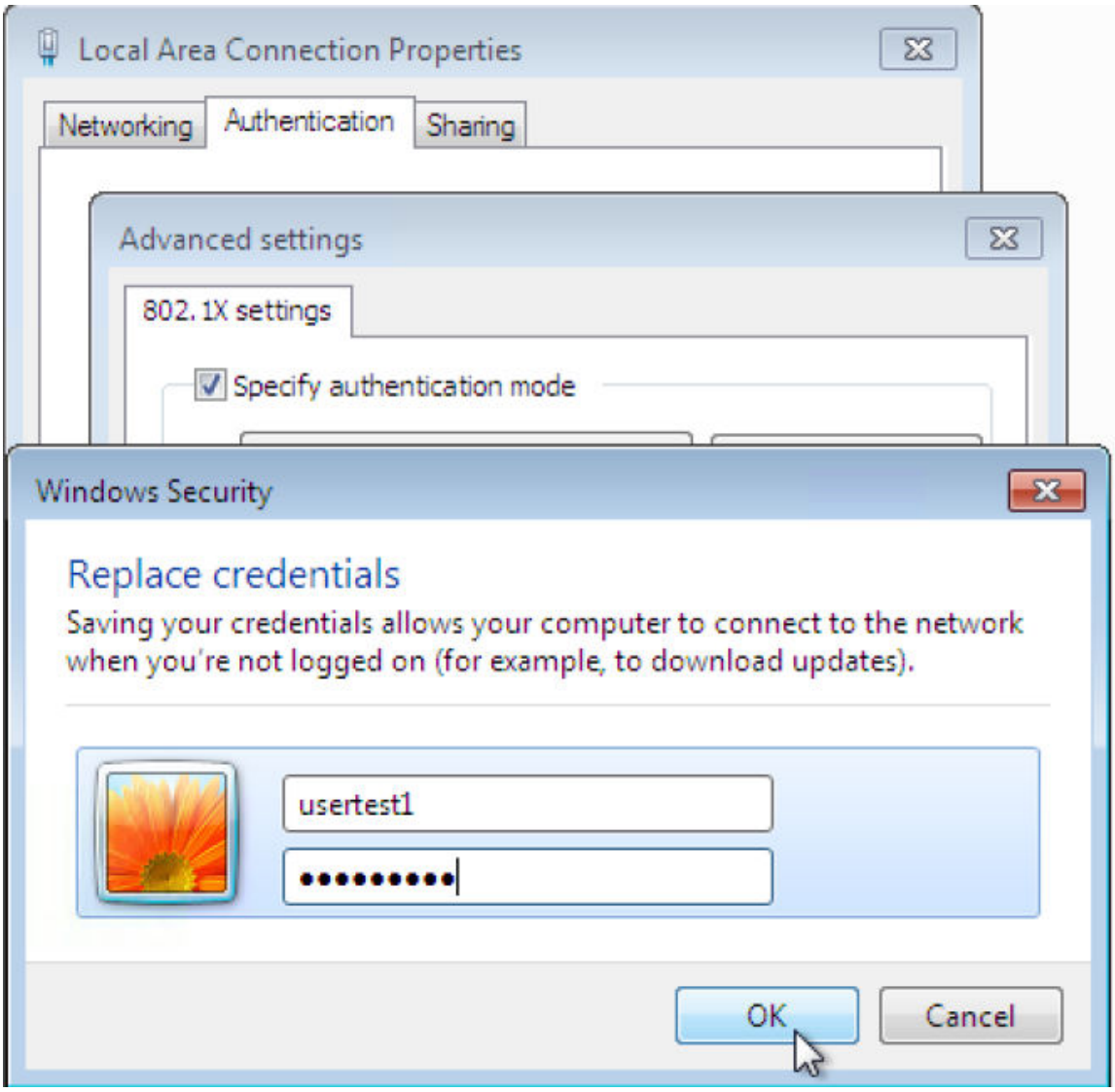
c. On the Authentication tab of the Local Area Connection Properties, click **Additional Settings.**



d. In Advanced settings, select **User Authentication** for the authentication mode and click **Replace credentials**.


Local Area Connection Properties
Networking
Authentication
Sharing
Advanced settings
802.1X settings
Specify authentication mode
User authentication
Replace credentials
Delete credentials for all users
Enable single sign on for this network
Perform immediately before user logon
Perform immediately after user logon
Maximum delay (seconds):
10
Allow additional dialogs to be displayed during single sign on
This network uses separate virtual LANs for machine and user authentication
OK
Cancel

e. Enter the user ID (usertest1) and password of the local user that you added to local user database on the Aruba ClearPass server.



Verification

IN THIS SECTION

Verifying Status of Authentication Requests on Aruba ClearPass Policy Manager | 34

Confirm that the configuration is working properly.

Verifying Authentication on the EX4300 Switch

Purpose

Verify that the test user, usertest1, is being authenticated and placed in the correct VLAN.

Action

1. Connect the Windows 7 laptop configured as described in "Configuring the Windows 7 Supplicant on the Laptop" on page 25 to ge-0/0/22 on the EX4300 switch.
2. On the switch, type the following command:

```
user@Policy-EX4300-01> show dot1x interface ge-0/0/22.0
802.1X Information:
Interface     Role           State           MAC address          User
ge-0/0/22.0   Authenticator  Authenticated   00:50:56:9B:03:7F    usertest1
```

3. For more details, including the dynamic VLAN assignment, type:

```
user@Policy-EX4300-01> show dot1x interface ge-0/0/22.0 detail
ge-0/0/22.0
  Role: Authenticator
  Administrative state: Auto
  Supplicant mode: Single
  Number of retries: 3
  Quiet period: 60 seconds
  Transmit period: 30 seconds
  Mac Radius: Enabled
  Mac Radius Restrict: Disabled
  Reauthentication: Enabled
  Configured Reauthentication interval: 3600 seconds
  Supplicant timeout: 30 seconds
```

```
Server timeout: 30 seconds
Maximum EAPOL requests: 2
Guest VLAN member: not configured
Number of connected supplicants: 1
  Supplicant: usertest1, 00:50:56:9B:03:7F
    Operational state: Authenticated
    Backend Authentication state: Idle
    Authentication method: Radius
    Authenticated VLAN: V201
    Session Reauth interval: 3600 seconds
    Reauthentication due in 3397 seconds
```

Meaning

802.1X authentication is working as configured—usertest1 has been successfully authenticated and placed in VLAN 201.

You can use the **show dot1x** command to also verify that the guest laptop is being properly authenticated using MAC RADIUS authentication.

Verifying Status of Authentication Requests on Aruba ClearPass Policy Manager

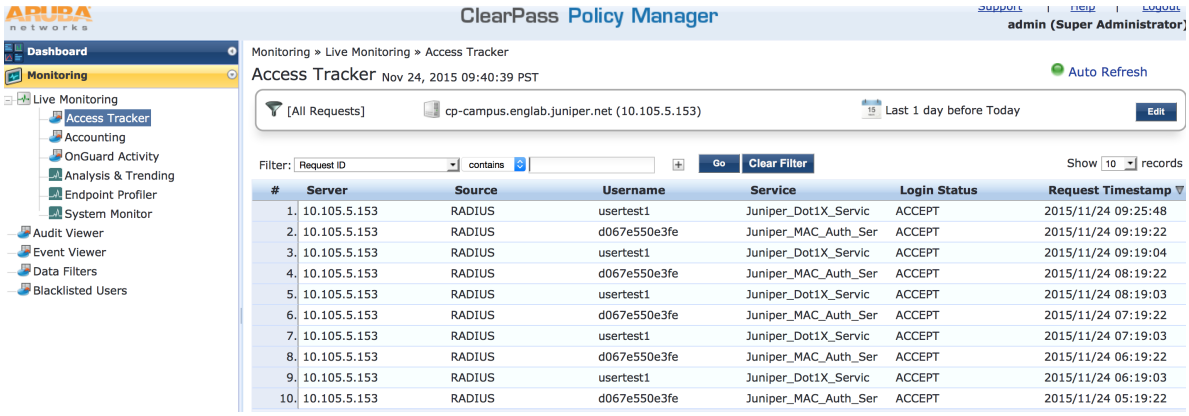
Purpose

Verify that the endpoints are being correctly authenticated and that the correct RADIUS attributes are being exchanged between the switch and Aruba ClearPass.

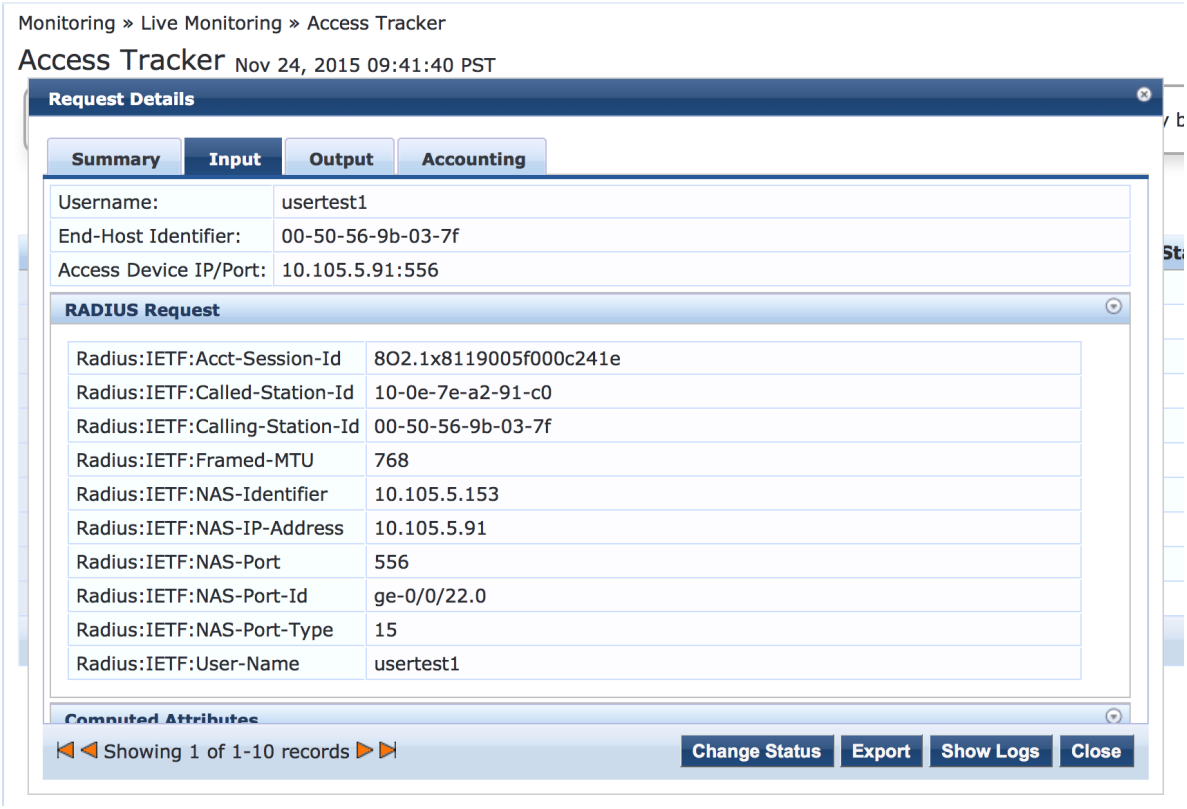
Action

1. Go to Monitoring > Live Monitoring > Access Tracker to display the status of the authentication requests.

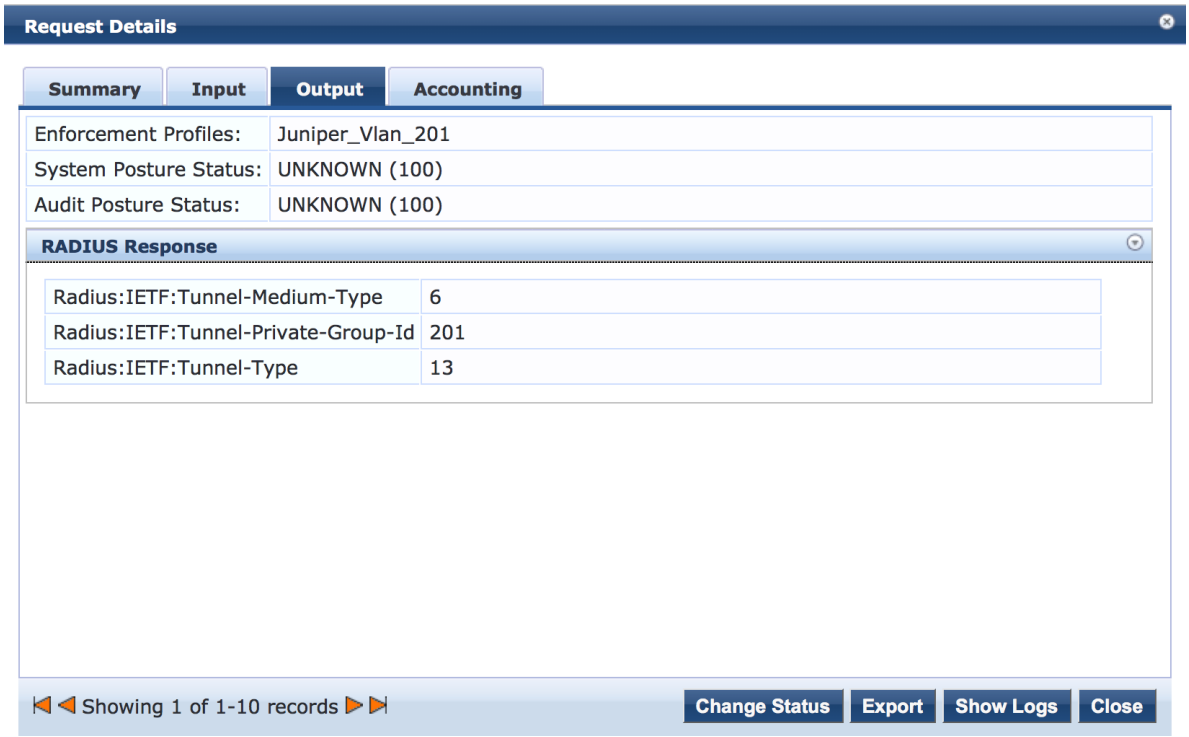
   The Access Tracker monitors authentication requests as they occur and reports on their status.



2. To verify the RADIUS attributes sent by the switch to Aruba ClearPass for a particular request, click the request and then click the Input tab in the Request Details window.



3. To verify the RADIUS attributes that Aruba ClearPass sent back to the switch for this request, click the Output tab.



Meaning

The Login Status field of the Access Tracker shows that the employee laptop and guest laptop are being successfully authenticated. The request details for the authentication request from usertest1 shows that the switch is sending the correct RADIUS attributes to Aruba ClearPass and that ClearPass is returning to the switch the correct RADIUS attributes specifying VLAN 201.

RELATED DOCUMENTATION

Troubleshooting Authentication | 37

Technical Overview | 3

Use Case Overview | 2

Troubleshooting Authentication

IN THIS SECTION

This topic describes how you get detailed diagnostic information by enabling tracing of authentication operations on the EX Series switch and on the Windows 7 supplicant.

Aruba ClearPass Policy Manager provides additional detailed diagnostic information. See your Aruba ClearPass documentation for more information.

This topic covers:

Enabling 802.1X Trace Options on EX Series Switches

You can enable trace options for the 802.1X protocol. The following set of commands enable the writing of trace logs to a file named **do1x-log**:

```
user@Policy-EX4300-01# set protocols dot1x traceoptions file dot1x-log
user@Policy-EX4300-01# set protocols dot1x traceoptions file size 5m
user@Policy-EX4300-01# set protocols dot1x traceoptions flag all
```

Use the `show log` CLI command to display the contents of the trace log file. For example:

```
user@Policy-EX4300-01> show log dot1x-log
user@Policy-EX4300-01> show log dot1x-log | last 10 | refresh
```

Performing 802.1X Diagnostics on the Windows 7 Supplicant

To perform 802.1X authentication diagnostics on the Windows 7 supplicant:

1. Start authentication tracing with the `netsh` command.

```
>netsh ras set tracing * enable
```

2. Attempt authentication with the switch.

3. Disable authentication tracing.

```
>netsh ras set tracing * disable
```

4. Review the detailed log files under the following directory: **C:\windows\tracing**.

Refer to the Windows 7 documentation for more detailed information about the diagnostic capabilities of the Windows 802.1X supplicant.

RELATED DOCUMENTATION

Example: Configuring 802.1X-PEAP and MAC RADIUS Authentication with EX Series Switches and Aruba ClearPass Policy Manager | 5

Technical Overview | 3

Use Case Overview | 2