

External Server for Authorization and Authentication

This chapter describes how to configure an external LDAP, RADIUS, or TACACS+ server to support AAA for the ASA. Before you configure the ASA to use an external server, you must configure the AAA server with the correct ASA authorization attributes and, from a subset of these attributes, assign specific permissions to individual users.

Understanding Policy Enforcement of Authorization Attributes

The ASA supports several methods of applying user authorization attributes (also called user entitlements or permissions) to VPN connections. You can configure the ASA to obtain user attributes from any combination of:

- a Dynamic Access Policy (DAP) on the ASA
- an external RADIUS or LDAP authentication and/or authorization server
- a group policy on the ASA

If the ASA receives attributes from all sources, the attributes are evaluated, merged, and applied to the user policy. If there are conflicts between attributes, the DAP attributes take precedence.

The ASA applies attributes in the following order (see Figure 13-1).

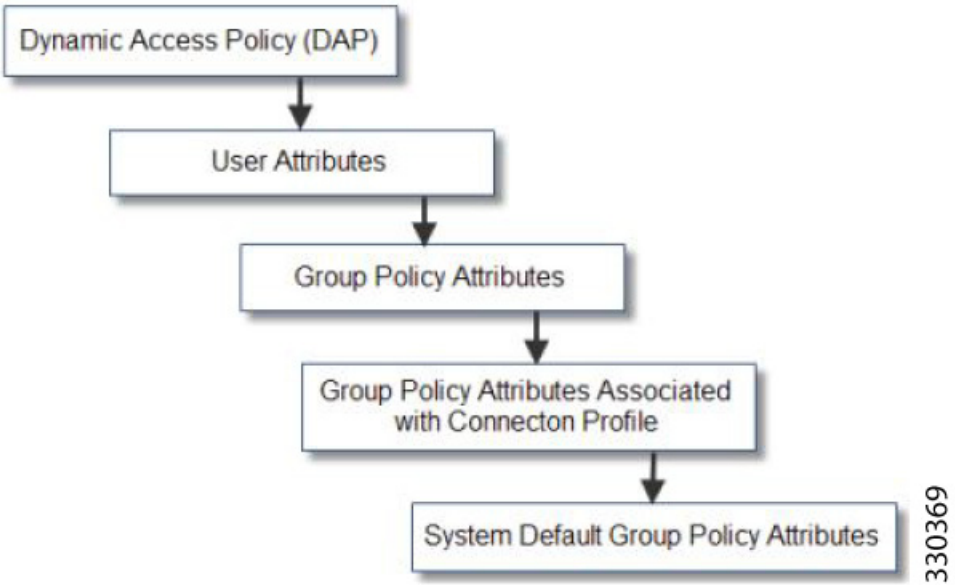
1. DAP attributes on the ASA—Introduced in Version 8.0(2), these attributes take precedence over all others. If you set a bookmark or URL list in DAP, it overrides a bookmark or URL list set in the group policy.
2. User attributes on the AAA server—The server returns these attributes after successful user authentication and/or authorization. Do not confuse these with attributes that are set for individual users in the local AAA database on the ASA (User Accounts in ASDM).
3. Group policy configured on the ASA—If a RADIUS server returns the value of the RADIUS CLASS attribute IETF-Class-25 (OU=*group-policy*) for the user, the ASA places the user in the group policy of the same name and enforces any attributes in the group policy that are not returned by the server.

   For LDAP servers, any attribute name can be used to set the group policy for the session. The LDAP attribute map that you configure on the ASA maps the LDAP attribute to the Cisco attribute IETF-Radius-Class.

4. Group policy assigned by the Connection Profile (called tunnel-group in the CLI)—The Connection Profile has the preliminary settings for the connection, and includes a default group policy applied to the user before authentication. All users connecting to the ASA initially belong to this group, which provides any attributes that are missing from the DAP, user attributes returned by the server, or the group policy assigned to the user.
5. Default group policy assigned by the ASA (DfltGrpPolicy)—System default attributes provide any values that are missing from the DAP, user attributes, group policy, or connection profile.

Figure 13-1 Policy Enforcement Flow

Defining the ASA LDAP Configuration



Authorization refers to the process of enforcing permissions or attributes. An LDAP server defined as an authentication or authorization server enforces permissions or attributes if they are configured.

Guidelines

The ASA enforces the LDAP attributes based on attribute name, not numeric ID. RADIUS attributes, are enforced by numeric ID, not by name.

For ASDM Version 7.0, LDAP attributes include the cVPN3000 prefix. For ASDM Versions 7.1 and later, this prefix was removed.

LDAP attributes are a subet of the Radius attributes, which are listed in the Radius chapter.

Active Directory/LDAP VPN Remote Access Authorization Examples

This section presents example procedures for configuring authentication and authorization on the ASA using the Microsoft Active Directory server. It includes the following topics:

- User-Based Attributes Policy Enforcement, page 13-3

- Placing LDAP Users in a Specific Group Policy, page 13-5
- Enforcing Static IP Address Assignment for AnyConnect Tunnels, page 13-7
- Enforcing Dial-in Allow or Deny Access, page 13-9
- Enforcing Logon Hours and Time-of-Day Rules, page 13-12

Other configuration examples available on Cisco.com include the following TechNotes.

- *ASA/PIX: Mapping VPN Clients to VPN Group Policies Through LDAP Configuration Example* at the following URL:

  http://www.cisco.com/en/US/products/ps6120/products_configuration_example09186a008089149d.shtml

- *PIX/ASA 8.0: Use LDAP Authentication to Assign a Group Policy at Login* at the following URL:

  http://www.cisco.com/en/US/products/ps6120/products_configuration_example09186a00808d1a7c.shtml

User-Based Attributes Policy Enforcement

You can map any standard LDAP attribute to a well-known Vendor-Specific Attribute (VSA), and you can map one or more LDAP attribute(s) to one or more Cisco LDAP attributes.

The following example shows how to configure the ASA to enforce a simple banner for a user who is configured on an AD LDAP server. On the server, use the Office field in the General tab to enter the banner text. This field uses the attribute named physicalDeliveryOfficeName. On the ASA, create an attribute map that maps physicalDeliveryOfficeName to the Cisco attribute Banner1. During authentication, the ASA retrieves the value of physicalDeliveryOfficeName from the server, maps the value to the Cisco attribute Banner1, and displays the banner to the user.

This example applies to any connection type, including the IPsec VPN client, AnyConnect SSL VPN client, or clientless SSL VPN. In the example, User1 connects through a clientless SSL VPN connection.

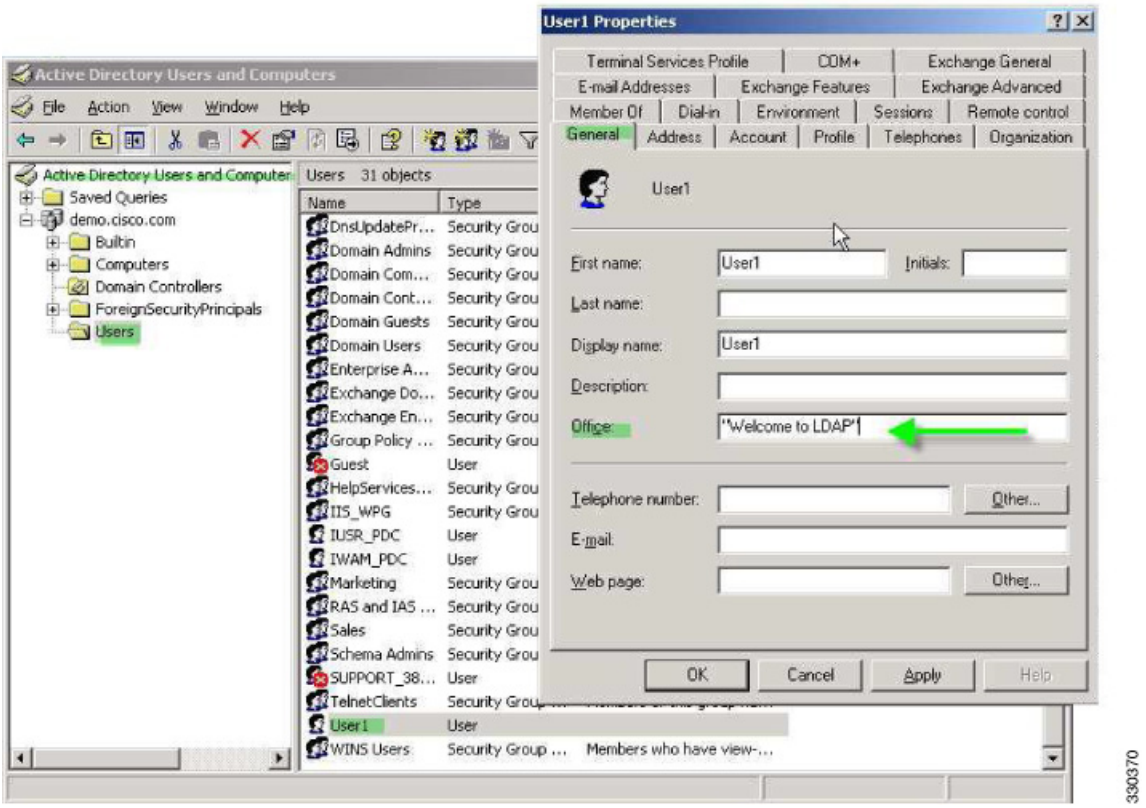
To configure the attributes for a user on the AD or LDAP Server, perform the following steps:

Step 1 Right-click a user.

The Properties dialog box appears (see Figure 13-2).

Step 2 Click the **General** tab and enter banner text in the Office field, which uses the AD/LDAP attribute physicalDeliveryOfficeName.

Figure 13-2 LDAP User Configuration



Step 3 Create an LDAP attribute map on the ASA.

The following example creates the map Banner and maps the AD/LDAP attribute physicalDeliveryOfficeName to the Cisco attribute Banner1:

```
hostname(config)# ldap attribute-map Banner
hostname(config-ldap-attribute-map)# map-name physicalDeliveryOfficeName Banner1
```

Step 4 Associate the LDAP attribute map to the AAA server.

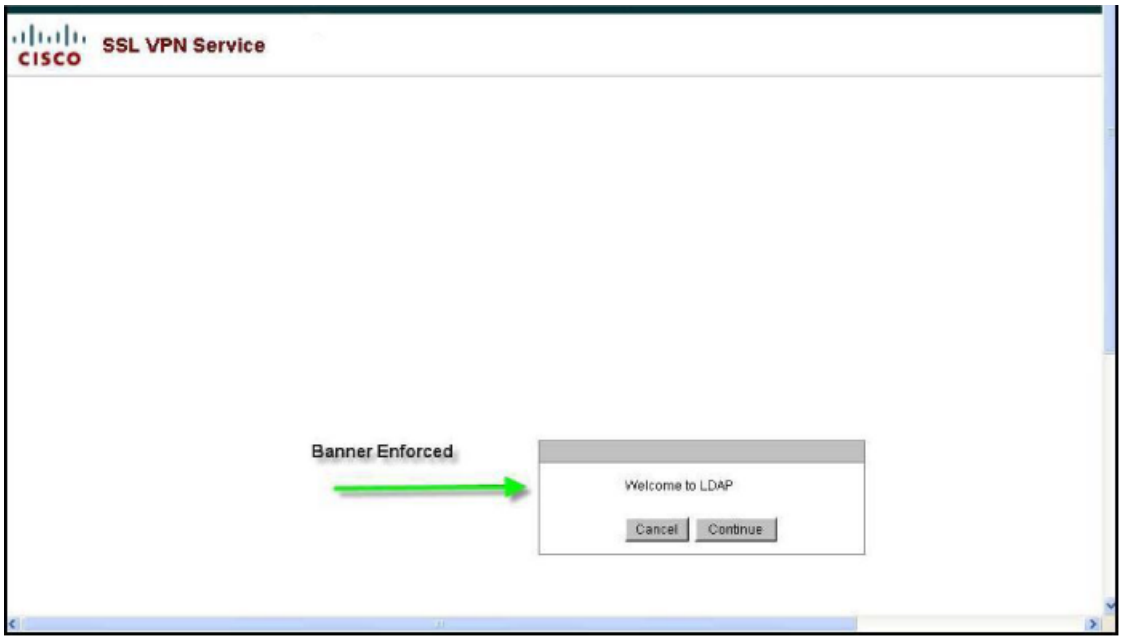
The following example enters the aaa server host configuration mode for the host 10.1.1.2 in the AAA server group MS_LDAP, and associates the attribute map Banner that you created in Step 3:

```
hostname(config)# aaa-server MS_LDAP host 10.1.1.2
hostname(config-aaa-server-host)# ldap-attribute-map Banner
```

Step 5 Test the banner enforcement.

The following example shows a clientless SSL connection and the banner enforced through the attribute map after the user authenticates (see Figure 13-3).

Figure 13-3 Banner Displayed



Placing LDAP Users in a Specific Group Policy

The following example shows how to authenticate User1 on the AD LDAP server to a specific group policy on the ASA. On the server, use the Department field of the Organization tab to enter the name of the group policy. Then create an attribute map, and map Department to the Cisco attribute IETF-Radius-Class. During authentication, the ASA retrieves the value of Department from the server, maps the value to the IETF-Radius-Class, and places User1 in the group policy.

This example applies to any connection type, including the IPsec VPN client, AnyConnect SSL VPN client, or clientless SSL VPN. In this example, User1 is connecting through a clientless SSL VPN connection.

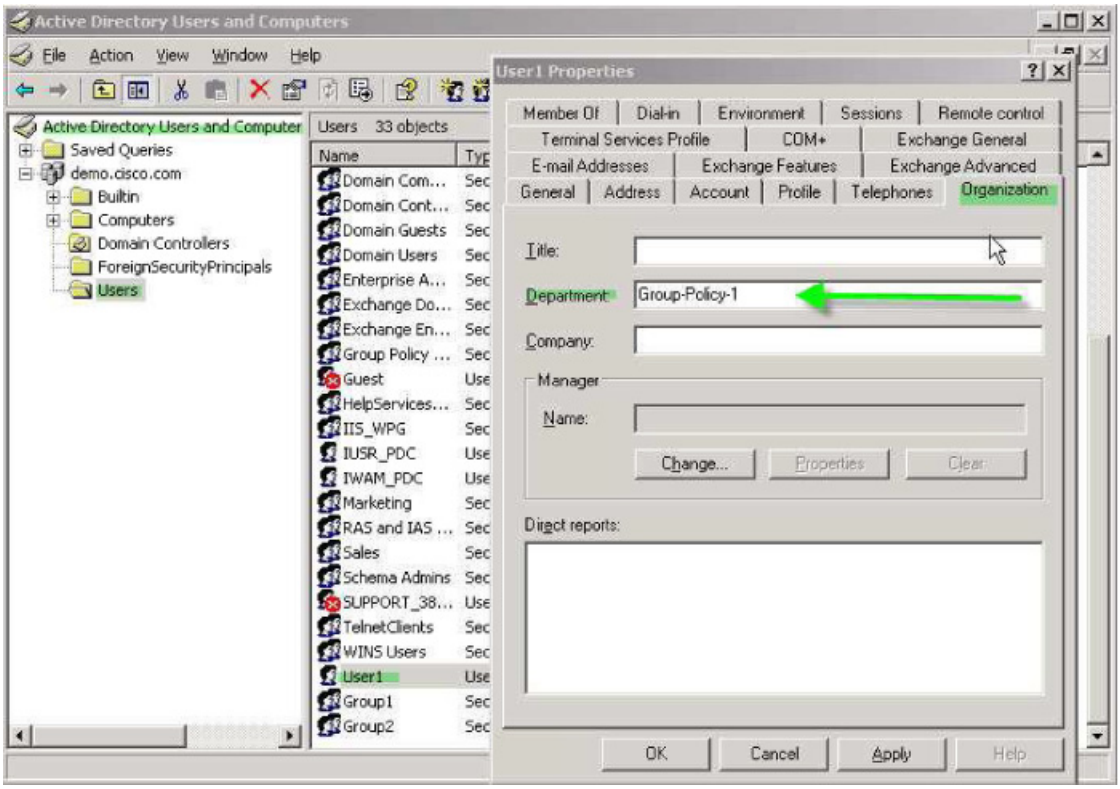
To configure the attributes for the user on the AD LDAP server, perform the following steps:

Step 1 Right-click the user.

The Properties dialog box appears (see Figure 13-4).

Step 2 Click the **Organization** tab and enter **Group-Policy-1** in the Department field.

Figure 13-4 AD/LDAP Department Attribute



Step 3 Define an attribute map for the LDAP configuration shown in Step 1.

The following example shows how to map the AD attribute Department to the Cisco attribute IETF-Radius-Class.

```
hostname(config)# ldap attribute-map group_policy
hostname(config-ldap-attribute-map)# map-name Department IETF-Radius-Class
```

Step 4 Associate the LDAP attribute map to the AAA server.

The following example enters the aaa server host configuration mode for the host 10.1.1.2 in the AAA server group MS_LDAP, and associates the attribute map group_policy that you created in Step 3:

```
hostname(config)# aaa-server MS_LDAP host 10.1.1.2
hostname(config-aaa-server-host)# ldap-attribute-map group_policy
```

Step 5 Add the new group-policy on the ASA and configure the required policy attributes that will be assigned to the user. The following example creates Group-policy-1, the name entered in the Department field on the server:

```
hostname(config)# group-policy Group-policy-1 external server-group LDAP_demo
hostname(config-aaa-server-group)#
```

Step 6 Establish the VPN connection as the user would, and verify that the session inherits the attributes from Group-Policy1 (and any other applicable attributes from the default group-policy).

Step 7 Monitor the communication between the ASA and the server by enabling the **debug ldap 255** command from privileged EXEC mode. The following is sample output from this command, which has been edited to provide the key messages:

```
[29] Authentication successful for user1 to 10.1.1.2
[29] Retrieving user attributes from server 10.1.1.2
```

```
[29] Retrieved Attributes:
[29] department: value = Group-Policy-1
[29] mapped to IETF-Radius-Class: value = Group-Policy-1
```

Enforcing Static IP Address Assignment for AnyConnect Tunnels

In this example, configure the AnyConnect client user Web1 to receive a static IP address. then enter the address in the Assign Static IP Address field of the Dialin tab on the AD LDAP server. This field uses the msRADIUSFramedIPAddress attribute. Create an attribute map that maps this attribute to the Cisco attribute IETF-Radius-Framed-IP-Address.

During authentication, the ASA retrieves the value of msRADIUSFramedIPAddress from the server, maps the value to the Cisco attribute IETF-Radius-Framed-IP-Address, and provides the static address to User1.

The following example applies to full-tunnel clients, including the IPsec client and the SSL VPN clients (AnyConnect client 2.x and the SSL VPN client).

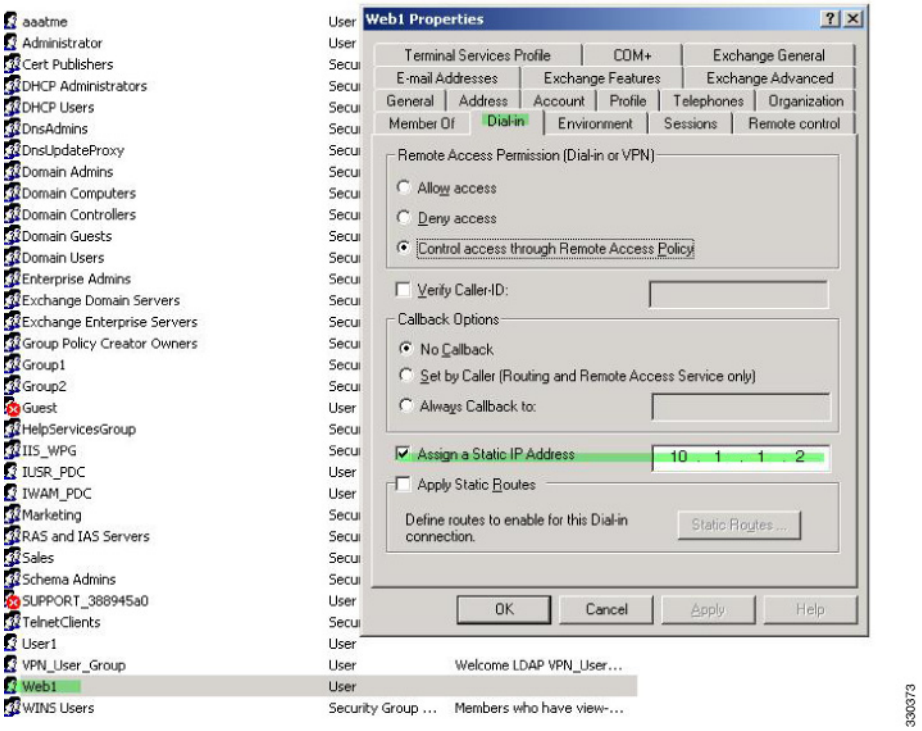
To configure the user attributes on the AD /LDAP server, perform the following steps:

Step 1 Right-click the username.

The Properties dialog box appears (see Figure 13-5).

Step 2 Click the **Dialin** tab, check the **Assign Static IP Address** check box, and enter an IP address of 10.1.1.2.

Figure 13-5 Assign Static IP Address



Step 3 Create an attribute map for the LDAP configuration shown in Step 1.

The following example shows how to map the AD attribute msRADIUSFramedIPAddress used by the Static Address field to the Cisco attribute IETF-Radius-Framed-IP-Address:

```
hostname(config)# ldap attribute-map static_address
hostname(config-ldap-attribute-map)# map-name msRADIUSFramedIPAddress
IETF-Radius-Framed-IP-Address
```

Step 4 Associate the LDAP attribute map to the AAA server.

The following example enters the aaa server host configuration mode for the host 10.1.1.2, in the AAA server group MS_LDAP, and associates the attribute map static_address that you created in Step 3:

```
hostname(config)# aaa-server MS_LDAP host 10.1.1.2
hostname(config-aaa-server-host)# ldap-attribute-map static_address
```

Step 5 Verify that the **vpn-address-assignment** command is configured to specify AAA by viewing this part of the configuration with the **show run all vpn-addr-assign** command:

```
hostname(config)# show run all vpn-addr-assign
vpn-addr-assign aaa   << Make sure this is configured >>
no vpn-addr-assign dhcp
vpn-addr-assign local
hostname(config)#
```

Step 6 Establish a connection to the ASA with the AnyConnect client. Observe the following:

- The banner is received in the same sequence as a clientless connection (see Figure 13-6).
- The user receives the IP address configured on the server and mapped to the ASA (see Figure 13-7).

Figure 13-6 Verify the Banner for the AnyConnect Session

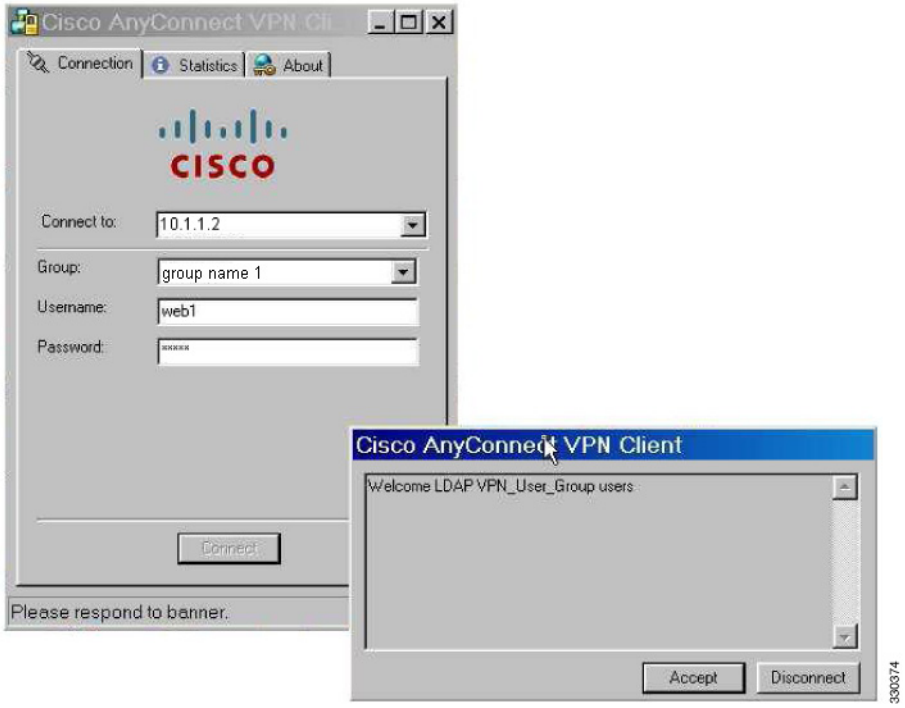


Figure 13-7 AnyConnect Session Established



Step 7 Use the **show vpn-sessiondb svc** command to view the session details and verify the address assigned:

```
hostname# show vpn-sessiondb svc

Session Type: SVC
Username     : web1                   Index        : 31
Assigned IP  : 10.1.1.2              Public IP    : 10.86.181.70
Protocol     : Clientless SSL-Tunnel DTLS-Tunnel
Encryption   : RC4 AES128             Hashing      : SHA1
Bytes Tx     : 304140                 Bytes Rx     : 470506
Group Policy : VPN_User_Group         Tunnel Group : Group1_TunnelGroup
Login Time   : 11:13:05 UTC Tue Aug 28 2007
Duration     : 0h:01m:48s
NAC Result   : Unknown
VLAN Mapping : N/A                    VLAN         : none
```

Enforcing Dial-in Allow or Deny Access

The following example creates an LDAP attribute map that specifies the tunneling protocols allowed by the user. You map the allow access and deny access settings on the Dialin tab to the Cisco attribute Tunneling-Protocol, which supports the bitmap values shown in Table 13-1:

Table 13-1 Bitmap Values for Cisco Tunneling-Protocol Attribute

Value	Tunneling Protocol
1	PPTP
2	L2TP
4[1]	IPsec (IKEv1)
8[2]	L2TP/IPsec

Table 13-1 Bitmap Values for Cisco Tunneling-Protocol Attribute (continued)

Value	Tunneling Protocol
16	Clientless SSL
32	SSL client—AnyConnect or SSL VPN client
64	IPsec (IKEv2)

1. IPsec and L2TP over IPsec are not supported simultaneously. Therefore, the values 4 and 8 are mutually exclusive.
2. See note 1.

Use this attribute to create an Allow Access (TRUE) or a Deny Access (FALSE) condition for the protocols, and enforce the method for which the user is allowed access.

For this simplified example, by mapping the tunnel protocol IPsec/IKEv1 (4), you can create an allow (true) condition for the Cisco VPN client. You also map WebVPN (16) and SVC/AC (32), which are mapped as a value of 48 (16+32) and create a deny (false) condition. This allows the user to connect to the ASA using IPsec, but any attempt to connect using clientless SSL or the AnyConnect client is denied.

Another example of enforcing dial-in allow access or deny access is available in the Tech Note *ASA/PIX: Mapping VPN Clients to VPN Group Policies Through LDAP Configuration Example* at the following URL:

http://www.cisco.com/en/US/products/ps6120/products_configuration_example09186a008089149d.shtml

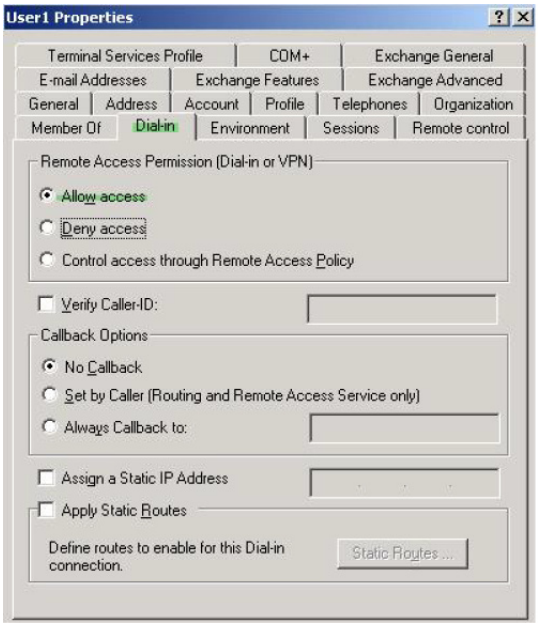
To configure the user attributes on the AD/LDAP server, perform the following steps:

Step 1 Right-click the user.

The Properties dialog box appears.

Step 2 Click the **Dial-in** tab, then click the **Allow Access** radio button (Figure 13-8).

Figure 13-8 AD/LDAP User1 - Allow Access



Note If you select the Control access through the Remote Access Policy option, then a value is not returned from the server, and the permissions that are enforced are based on the internal group policy settings of the ASA.

Step 3 Create an attribute map to allow both an IPsec and AnyConnect connection, but deny a clientless SSL connection.

The following example shows how to create the map tunneling_protocols, and map the AD attribute msNPAllowDialin used by the Allow Access setting to the Cisco attribute Tunneling-Protocols using the **map-name** command, and add map values with the **map-value** command:

```
hostname(config)# ldap attribute-map tunneling_protocols
hostname(config-ldap-attribute-map)# map-name msNPAllowDialin Tunneling-Protocols
hostname(config-ldap-attribute-map)# map-value msNPAllowDialin FALSE 48
hostname(config-ldap-attribute-map)# map-value msNPAllowDialin TRUE 4
```

Step 4 Associate the LDAP attribute map to the AAA server.

The following example enters the aaa server host configuration mode for the host 10.1.1.2, in the AAA server group MS_LDAP, and associates the attribute map tunneling_protocols that you created in Step 2:

```
hostname(config)# aaa-server MS_LDAP host 10.1.1.2
hostname(config-aaa-server-host)# ldap-attribute-map tunneling_protocols
```

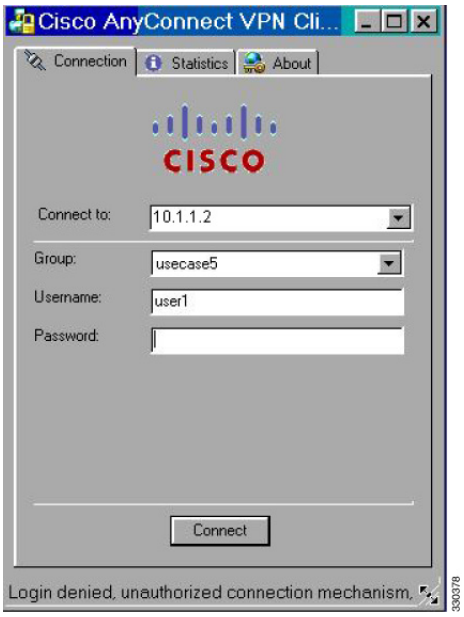
Step 5 Verify that the attribute map works as configured.

Step 6 Try connections using clientless SSL, the AnyConnect client, and the IPsec client. The clientless and AnyConnect connections should fail, and the user should be informed that an unauthorized connection mechanism was the reason for the failed connection. The IPsec client should connect because IPsec is an allowed tunneling protocol according to the attribute map (see Figure 13-9 and Figure 13-10).

Figure 13-9 Login Denied Message for Clientless User



Figure 13-10 Login Denied Message for AnyConnect Client User



Enforcing Logon Hours and Time-of-Day Rules

The following example shows how to configure and enforce the hours that a clientless SSL user (such as a business partner) is allowed to access the network.

On the AD server, use the Office field to enter the name of the partner, which uses the physicalDeliveryOfficeName attribute. Then we create an attribute map on the ASA to map that attribute to the Cisco attribute Access-Hours. During authentication, the ASA retrieves the value of physicalDeliveryOfficeName and maps it to Access-Hours.

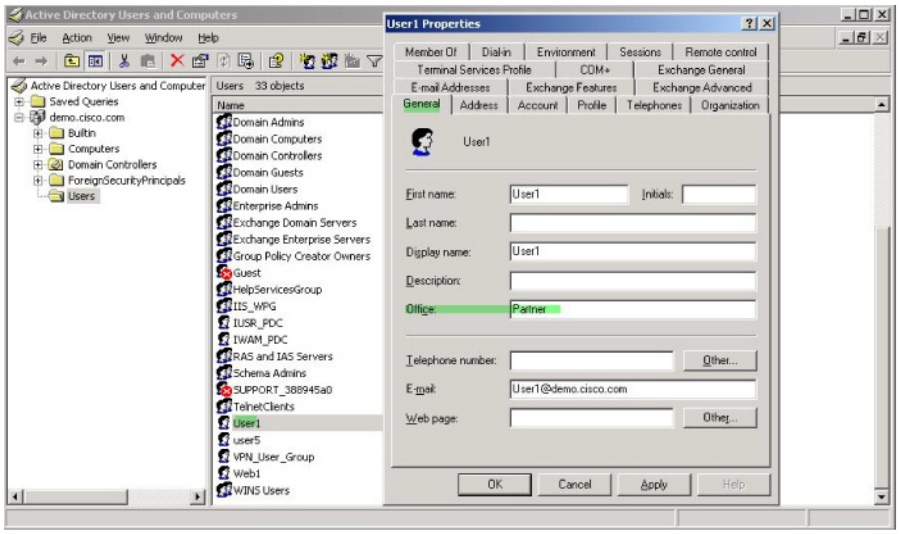
To configure the user attributes on the AD /LDAP server, perform the following steps:

Step 1 Select the user, and right-click **Properties**.

The Properties dialog box appears (see Figure 13-11).

Step 2 Click the **General** tab.

Figure 13-11 Active Directory Properties Dialog Box



Step 3 Create an attribute map.

The following example shows how to create the attribute map access_hours and map the AD attribute physicalDeliveryOfficeName used by the Office field to the Cisco attribute Access-Hours.

```
hostname(config)# ldap attribute-map access_hours
hostname(config-ldap-attribute-map)# map-name physicalDeliveryOfficeName Access-Hours
```

Step 4 Associate the LDAP attribute map to the AAA server.

The following example enters the aaa server host configuration mode for the host 10.1.1.2, in the AAA server group MS_LDAP, and associates the attribute map access_hours that you created in Step 3:

```
hostname(config)# aaa-server MS_LDAP host 10.1.1.2
hostname(config-aaa-server-host)# ldap-attribute-map access_hours
```

Step 5 Configure time ranges for each value allowed on the server.

The following example configures Partner access hours from 9am to 5pm Monday through Friday:

```
hostname(config)# time-range Partner
hostname(config-time-range)# periodic weekdays 09:00 to 17:00
```

Configuring Authorization with LDAP for VPN

After LDAP authentication for VPN access has succeeded, the ASA queries the LDAP server, which returns LDAP attributes. These attributes generally include authorization data that applies to the VPN session.

You may require authorization from an LDAP directory server that is separate and distinct from the authentication mechanism. For example, if you use an SDI or certificate server for authentication, no authorization information is passed back. For user authorizations in this case, you can query an LDAP directory after successful authentication, accomplishing authentication and authorization in two steps.

To set up VPN user authorization using LDAP, perform the following steps.

Detailed Steps

	Command	Purpose

Step 1	**aaa-server** *server_group* **protocol** {**kerberos** | **ldap** | **nt** | **radius** | **sdi** | **tacacs+**}
	
	Example:
	`hostname(config)# aaa-server servergroup1 protocol ldap`
	`hostname(config-aaa-server-group)`
		Creates a AAA server group.

Step 2	**tunnel-group** *groupname* **Example:** `hostname(config)# tunnel-group remotegrp`	Creates an IPsec remote access tunnel group named remotegrp.
Step 3	**tunnel-group** *groupname* **general-attributes** **Example:** `hostname(config)# tunnel-group remotegrp general-attributes`	Associates the server group and the tunnel group.
Step 4	**authorization-server-group** *group-tag* **Example:** `hostname(config-general)# authorization-server-group ldap_dir_1`	Assigns a new tunnel group to a previously created AAA server group for authorization.

Examples

While there are other authorization-related commands and options available for specific requirements, the following example shows commands for enabling user authorization with LDAP. The example then creates an IPsec remote access tunnel group named remote-1, and assigns that new tunnel group to the previously created ldap_dir_1 AAA server group for authorization:

```
hostname(config)# tunnel-group remote-1 type ipsec-ra
hostname(config)# tunnel-group remote-1 general-attributes
hostname(config-general)# authorization-server-group ldap_dir_1
hostname(config-general)#
```

After you complete this configuration work, you can then configure additional LDAP authorization parameters such as a directory password, a starting point for searching a directory, and the scope of a directory search by entering the following commands:

```
hostname(config)# aaa-server ldap_dir_1 protocol ldap
hostname(config-aaa-server-group)# aaa-server ldap_dir_1 host 10.1.1.4
hostname(config-aaa-server-host)# ldap-login-dn obscurepassword
hostname(config-aaa-server-host)# ldap-base-dn starthere
hostname(config-aaa-server-host)# ldap-scope subtree
hostname(config-aaa-server-host)#
```