CHAPTER 20

Understanding the Directory

Directories comprise specialized databases that are optimized for a high number of reads and searches and occasional writes and updates. Directories typically store data that does not change often, such as employee information, user privileges on the corporate network, and so on.

Because directories are extensible, you can modify and extend the type of information that is stored in them. The term directory schema refers to the type of stored information and the rules that it obeys. Many directories provide methods for extending the directory schema to accommodate information types that different applications define. This capability enables enterprises to use the directory as a central repository for user information.

The Lightweight Directory Access Protocol (LDAP) provides applications with a standard method for accessing and potentially modifying the information that is stored in the directory. This capability enables companies to centralize all user information in a single repository, available to several applications, with a reduction in maintenance costs through the ease of adds, moves, and changes.

This chapter covers the main principles for synchronizing Cisco CallManager with a corporate LDAP directory. The chapter also discusses the administrator's choice not to synchronize with a corporate LDAP directory and the consequences of that choice of configuration. The chapter also summarizes considerations for providing Cisco IP Telephony endpoints, such as Cisco IP Phones and Cisco IP SoftPhone, with access to a corporate LDAP directory.

The following list summarizes the changes in directory functionality from previous releases of Cisco CallManager:

- The directory component has been decoupled from Cisco CallManager to ensure high Cisco CallManager availability independent of the corporate directory.
- Cisco CallManager and related applications store all application data in the local database instead of in an embedded directory. The embedded directory gets removed and Cisco CallManager supports synchronization with the customer directory.

This chapter includes the following topics:

The considerations that this chapter presents apply to Cisco CallManager as well as the following applications that are bundled with it: Cisco CallManager Extension Mobility, Cisco WebDialer, Bulk Administration Tool, and Real-Time Monitoring Tool.

For all other Cisco voice applications, refer to the respective product documentation that is available at

http://www.cisco.com

In particular, for Cisco Unity, refer to the *Cisco Unity Design Guide* and to the following white papers: *Cisco Unity Data and the Directory*, *Active Directory Capacity Planning*, and *Cisco Unity Data Architecture and How Cisco Unity Works*.

Cisco CallManager and the Corporate LDAP Directory

Administrators access directory information about end users from the Cisco CallManager Administration End User Configuration window (**User Management > End User**). Administrators use this window to add, update, and delete user information such as user ID, password, and device association, but only if synchronization from the LDAP Server is not enabled (that is, if the Enable Synchronizing from LDAP Server check box is not checked in the Cisco CallManager Administration LDAP System window).

Applications and Services That Use the Database

The following Cisco CallManager applications and services use the database for user and other types of information:

- Bulk Administration Tool (BAT)
- Tool for Auto-Registered Phone Support (TAPS)
- AXL
- Cisco CallManager Extension Mobility
- Cisco CallManager User Options
- Cisco Conference Connection
- CTIManager
- CDR Analysis and Reporting (CAR)
- Cisco IP Manager Assistant (IPMA)
- Cisco Customer Response Solutions (CRS)
- Cisco Emergency Responder (CER)
- Cisco IP Phone Services
- Personal Address Book (PAB)
- FastDials
- Cisco WebDialer
- Cisco IP Communicator
- Cisco CallManager Attendant Console

Directory Access

The following definition applies throughout this chapter:

- Directory access refers to the ability of Cisco IP Telephony endpoints, such as Cisco IP Phones and Cisco IP SoftPhone, to access a corporate LDAP directory.

Figure 20-1 Directory Access for Cisco IP Telephony Endpoints

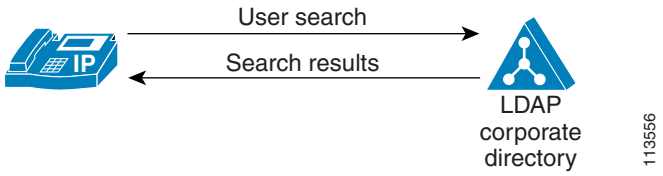


Figure 20-1 illustrates directory access as it is defined in this chapter. In this example, a Cisco IP Phone gets access. The client application performs a user search against an LDAP directory, such as the corporate directory of an enterprise, and receives several matching entries. The Cisco IP Phone user can then select one entry and use it to dial the corresponding person from the Cisco IP Phone.

Note Directory access, as defined here, involves only read operations on the directory and does not require that the administrator make any directory schema extensions or other configuration changes.

DirSync Service

The DirSync application performs the synchronization of data in the Cisco CallManager database with the customer LDAP directory information. Cisco CallManager administrators set up the DirSync service by first configuring the LDAP-directory-related Cisco CallManager windows. The following windows apply:

- LDAP System (**System > LDAP System**)
- LDAP Directory (**System > LDAP Directory**)

DirSync allows Cisco CallManager to synchronize the data from corporate directories to Cisco CallManager. DirSync allows synchronization from Microsoft Active Directory (AD) or Netscape/iPlanet Directory to the Cisco CallManager database.

Note A DirSync that is invoked for Microsoft Active Directory performs a complete (total) synchronization of data. A DirSync that is invoked for Netscape Directory performs an incremental synchronization.

DirSync allows the following options:

- Automatic synchronization, which synchronizes the data at regular intervals
- Manual Synchronization, which allows forcing the synchronization
- Stop Synchronization, which stops the current synchronization. If synchronization is in progress, check for agreement.

Note When directory synchronization is enabled, Cisco CallManager Administration cannot update any user information that is synchronized from the customer's Corporate Directory.

DirSync Service Parameters

You can configure service parameters for the DirSync service. Use the **System > Service Parameters** menu option in Cisco CallManager Administration. On the window that displays, choose a server in the Server drop-down list box. Choose the Cisco DirSync service in the Service drop-down list box. The Service Parameter Configuration window allows configuration of the DirSync service parameters.

For more information about the DirSync service, refer to the *Cisco CallManager Serviceability System Guide* and the *Cisco CallManager Serviceability Administration Guide.*

Data Migration Assistant

The Cisco CallManager Data Migration Assistant (DMA) provides conversion of Cisco CallManager 4.x data to a format that is compatible with Cisco CallManager 5.0.

For details on obtaining, installing, and using DMA, refer to the *Cisco CallManager Data Migration Assistant 1.0 User Guide*.

Authentication

The authentication process verifies the identity of the user by validating the user ID and password before granting access to the system. Verification takes place against the existing database or the LDAP corporate directory.

The system makes authentication, which the Cisco CallManager administrator makes available in the LDAP Authentication window, available only if LDAP synchronization is enabled in the LDAP System window. If synchronization and authentication are both enabled, the following actions take place:

- The system always authenticates application users against the Cisco CallManager database. When both synchronization and authentication are enabled, the user gets authenticated against the corporate directory. Thus, users need to use their corporate directory password.
- If only synchronization is enabled (and authentication is not enabled), users get authenticated against the Cisco CallManager database. In this case, the administrator can configure a password by using the Cisco CallManager Administration End User Configuration window. The default password specifies *ciscocisco*.

Using the Cisco CallManager Database Versus the Corporate LDAP Directory

Two options exist for using directory information:

- To use only the Cisco CallManager database for users, which is the default functionality when you install Cisco CallManager, Release 5.0, create users with End User Configuration to add to the database (password, names, device association, and so forth). Authentication takes place against the information that is configured in Cisco CallManager Administration. End users and administrators can make password changes if this method is used. This method does not entail LDAP synchronization.
- To use the Corporate LDAP directory (either Microsoft Active Directory or Netscape Directory) with Cisco CallManager, the following steps must take place:
  - For users to use their LDAP corporate directory passwords, the Cisco CallManager administrator must configure LDAP authentication (System > LDAP > LDAP Authentication).
  - Administrators cannot configure LDAP authentication unless they first configure LDAP synchronization. Doing so blocks further End User configuration.

Note Keep in mind that configuring authentication is optional. If authentication is not enabled, administrators and end users have two passwords, an Active Directory or Netscape Directory password and a Cisco CallManager password, which is *ciscocisco* by default.

Directory Access for Cisco IP Telephony Endpoints

The guidelines in this section apply regardless of whether Cisco CallManager or other IP Telephony applications have been synchronized with a corporate directory. The end-user perception in both cases remains the same because the differences affect only how applications store their user information and how such information is kept consistent across the network.

The following sections summarize how to configure corporate directory access to any LDAPv3-compliant directory server for XML-capable phones such Cisco IP Phone models 7940, 7960, and so on.

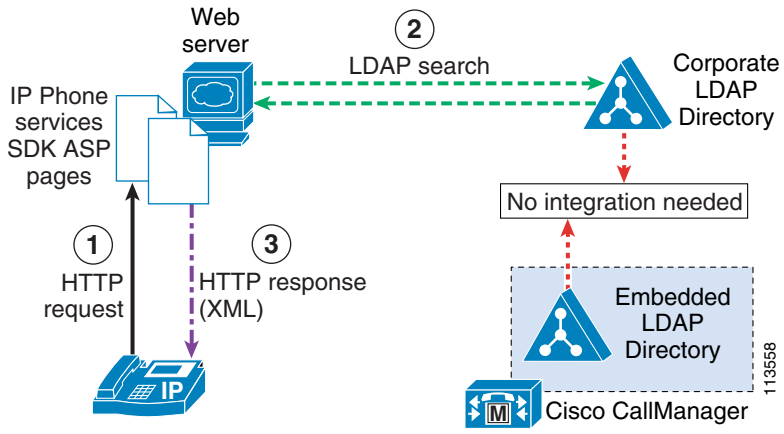
Note Cisco IP SoftPhone, Release 1.2 and later, includes a built-in mechanism to access and search LDAP directories, as does the Cisco IP Communicator. Refer to the product documentation for details on how to configure this feature.

Directory Access for Cisco IP Phones

XML-capable Cisco IP Phones (such as models 7940, 7960, and so on) can search a corporate LDAP directory when a user presses the Directories button on the phone. The IP phones use HyperText Transfer Protocol (HTTP) to send requests to a web server. The responses from the web server must contain some specific Extensible Markup Language (XML) objects that the phone can interpret and display. In the case of a corporate directory search, the web server operates as a proxy by receiving the request from the phone and translating it into an LDAP request, which is in turn sent to the corporate directory server. After being encapsulated in the appropriate XML objects, the response gets interpreted and sent back to the phone.

Figure 20-2 illustrates this mechanism in a deployment where Cisco CallManager has not been synchronized with the corporate directory. In this scenario, the message exchange does not involve Cisco CallManager.

Figure 20-2 Message Exchange for Cisco IP Phone Corporate Directory Access Without Directory Synchronization



You can configure the proxy function that the web server provided by using the Cisco IP Phone Services Software Development Kit (SDK) version 2.0 or later, which includes the Cisco LDAP Search Component Object Model (COM) server.

In addition, directory access for Cisco IP Phones includes the following characteristics:

- The system supports all LDAPv3-compliant directories.
- Cisco CallManager user preferences (speed dials, call forward all, personal address book) do not get synchronized with the corporate LDAP directory. Therefore, users have a separate login and password to access the Cisco CallManager User Options window.

LDAP Directory Configuration Checklist

Table 20-1 lists the general steps and guidelines for configuring LDAP directory information.

Table 20-1 User Directory Configuration Checklist

Configuration Steps		Related procedures and topics
Step 1	Use the LDAP System windows to configure LDAP system settings.	LDAP System Configuration, *Cisco CallManager Administration Guide*
Step 2	Use the LDAP Directory windows to configure LDAP directory settings.	LDAP Directory Configuration, *Cisco CallManager Administration Guide*
Step 3	Use the LDAP Authentication windows to configure LDAP authentication settings.	LDAP Authentication Configuration, *Cisco CallManager Administration Guide*

Table 20-1 User Directory Configuration Checklist (continued)

Configuration Steps		Related procedures and topics
Step 4	If directory synchronization is enabled, use the DirSync service to synchronize with the customer's corporate LDAP directory.	*Cisco CallManager Serviceability System Guide* *Cisco CallManager Serviceability Administration Guide*
Step 5	To convert Cisco CallManager 4.x data to a format that is compatible with Cisco CallManager 5.0, use the Cisco CallManager Data Migration Assistant (DMA).	*Cisco CallManager Data Migration Assistant 1.0 User Guide*

Where to Find More Information

Related Topics

- LDAP System Configuration, *Cisco CallManager Administration Guide*
- LDAP Directory Configuration, *Cisco CallManager Administration Guide*
- LDAP Authentication Configuration, *Cisco CallManager Administration Guide*
- *Cisco CallManager Data Migration Assistant 1.0 User Guide*
- *Cisco CallManager Serviceability System Guide*
- *Cisco CallManager Serviceability Administration Guide*
- Cisco CallManager Groups, page 5-3
- System Configuration Checklist, page 5-16
- Application Users and End Users, page 21-1
- Application User Configuration, *Cisco CallManager Administration Guide*
- End User Configuration, *Cisco CallManager Administration Guide*

Additional Cisco Documentation

- *Installing Cisco CallManager Release 5.0(1)*
- *Cisco IP Telephony Solution Reference Network Design for Cisco CallManager*