



White Paper

Planning a Successful Network Installation of AutoCAD 2004 or AutoCAD 2004-Based Products

Important Note: All references to "AutoCAD[®]" or "AutoCAD 2004" also apply to AutoCAD[®] 2004 platform-based products, for example, Autodesk[®] Architectural Desktop 2004, AutoCAD[®] Mechanical 2004, and Autodesk Map[™] 2004.

A successful network installation of AutoCAD 2004 and AutoCAD 2004-based software products starts with good planning. This white paper is the first in a three-part series designed to assist CAD managers and network administrators in their planning and installation work.

- This white paper outlines the prerequisites for installing AutoCAD 2004, the Autodesk[®] Network License Manager (NLM), and the new Network Installation wizard (NIW).
- The second white paper in the series, "Installing the Autodesk Network License Manager for AutoCAD 2004 or AutoCAD 2004-Based Products," provides a detailed, step-by-step process for installing and running the Autodesk Network License Manager used by all AutoCAD 2004-based products. This white paper also outlines the different configurations for the NLM and gives an overview of the new borrowing feature in AutoCAD 2004.
- The third white paper in the series, "Creating Deployments for AutoCAD 2004 or AutoCAD 2004-Based Products," provides a detailed, step-by-step process for creating deployments used to install AutoCAD 2004 on local workstations. It covers all the new features that can be found in AutoCAD 2004 like setting up support paths and adding customized files.

Overview

AutoCAD 2004 continues to improve and enhance the license management technology that was introduced in the AutoCAD 2002 software release. AutoCAD 2004 now incorporates FLEX[™] version 8.3 from Macrovision Corporation. With the inclusion of version 8.3, AutoCAD licenses can now be borrowed for a specified amount of time from the Autodesk Network License Manager. Borrowing allows a network license to be checked out, allowing the AutoCAD program to start and run while the computer is disconnected from the network.

AutoCAD 2004 has also replaced the Network Setup Wizard with the more powerful NIW. The NIW allows network administrators and CAD managers to include customized files in the AutoCAD installation, set the AutoCAD support paths and more.

Autodesk Network License Manager

The Autodesk Network License Manager uses the TCP/IP protocol for communication between AutoCAD software and the license manager. The FLEX[™] license manager is

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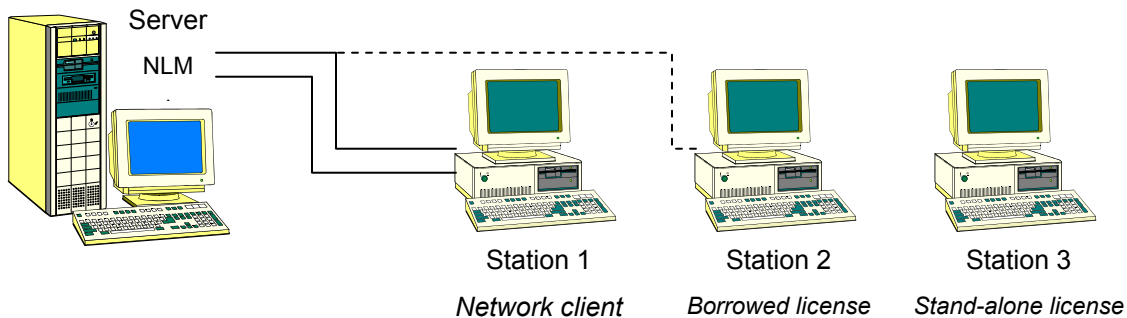
designed to run in a Microsoft® Windows® networking environment. Although Macrovision Corporation supports the FLEX/m product in other networking environments such as Novell® and Linux, the Autodesk implementation of FLEX/m must be installed and run on a Windows NT® 4.0, Windows 2000, or Windows XP Professional operating system.

FLEX/m software has the distinct advantage of supporting the network environment of small customers while allowing large customers to leverage existing investments in network license-management capabilities with increased reliability and better support. While the underlying license management technology may change from release to release, the end user will see no difference.

The license management technology consists of three main components: the FLEX/m server (*lmgrd.exe*), the Autodesk vendor daemon (*adskflex.exe*), and a license file (*<<username>>.lic* or *<<username>>.dat*). During the authorization process, the CAD manager or the network administrator obtains and names the license file.

How Does It Work?

FLEX/m is a client-server application. In the simplest form of this client-server application, when the AutoCAD program (the client) requests a license from the license manager (the server), the license is either granted or denied. The illustration shows the process that takes place when AutoCAD software is launched from a local workstation.



- Start AutoCAD software. Windows launches the executable program (*acad.exe*). In the preceding illustration, Stations 1 and 2 are running a network client version of AutoCAD and require the presence of the Autodesk NLM initially. After using the License Borrowing utility on Station 2, the AutoCAD program can run without the presence of the network or the NLM. Station 3 is a stand-alone version that does not require the network. In all three examples, AutoCAD is installed on the local hard drive.
- When running as a network client, AutoCAD software checks for a file called *licpath.lic* in the program's executable directory and reads the information contained in the file or looks for an environment variable which specifies the server running the NLM. The *licpath.lic* file contains the host name and host ID (Ethernet or MAC address) of the computer running the NLM. AutoCAD sends information about itself to the NLM.
 - AutoCAD software is recognized by the FLEX/m server, which returns the location for the vendor daemon to AutoCAD. AutoCAD software then establishes a connection with the vendor daemon and sends a license request.
 - The NLM checks to see if any licenses are available and sends a grant or denial to AutoCAD. The NLM determines license availability based on the information

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contained in its license file. The NLM license file should not be confused with the *licpath.lic* file AutoCAD software uses to locate the NLM.

The NLM must be installed, authorized, and running before an AutoCAD network client version will run on a local workstation. AutoCAD software must be installed on a local workstation from a deployment created by the NIW. (A *deployment* is an installation image to install AutoCAD on the workstation.) The NLM and Network Installation wizard are discussed in more detail later in this white paper.

- When running a borrowed license, the License Borrowing utility must first be run before an AutoCAD network client version is started. After starting AutoCAD, while the License Borrowing utility is running, the license can be checked out from the NLM. After checking out a license, the computer can be disconnected from the network and AutoCAD will run without requesting a license from the NLM. When the computer is reconnected to the network, the license is returned to the NLM and AutoCAD will now again request a license from the NLM. A license must be available in order for the AutoCAD program to run.
- When running as a stand-alone version, AutoCAD does not require the network or the NLM to be present in order to run.

The next section discusses the system requirements necessary to run the NLM and AutoCAD software.

System Requirements

The requirements are different for a system that runs the Autodesk NLM, for a system that stores deployments used by workstations to install AutoCAD software, and for a system that actually runs AutoCAD. The sections that follow summarize the requirements for each type of system.

Requirements for a System Running the Autodesk License Manager

The computer that runs the NLM must meet the following system requirements:

Hardware/Software	Requirement	Notes
Operating system	Windows XP Professional Windows 2000 Server Edition Windows 2000 Windows NT 4.0 Server Edition Windows NT 4.0	Windows NT 4.0 requires Service Pack 6a or later.
Network Interface Card (NIC)	Compatible with existing Ethernet networking infrastructure	The NLM supports multiple network interface cards and network adapters.
Communication protocol	TCP/IP	The NLM uses TCP packet types.

General notes:

- The NLM supports Ethernet network configurations only.
- There are no specific hardware requirements for CPU, RAM, and disk space associated with the FLEXlm application. The computer running the NLM should meet the minimum requirements specified by Microsoft for the operating system being run.

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- Although Macrovision Corporation supports FLEX/m on other operating systems and on Windows 95, Windows 98, and Windows Me, Autodesk supports FLEX/m and the NLM only on Windows NT 4.0, Windows 2000 and Windows XP Professional. The NLM is not supported under Windows XP Home.
- The workstation and server must be able to communicate using the TCP/IP protocol. The white papers in this series do not discuss the specifics required to set up the TCP/IP protocol on either a workstation or a server; however, this white paper does outline a process to ensure that communication is occurring. Please consult your operating system documentation and network adapter manuals for information about configuring TCP/IP.

Requirements for a System Storing Deployments Used to Install AutoCAD Software

Every AutoCAD network installation requires the creation of at least one deployment. The deployment is created in a shared location accessible to all users who need to run AutoCAD software. A single deployment requires approximately 350MB of disk space in the shared folder. More space may be required for the addition of custom files. The new NIW can modify existing deployments, thus requiring very little additional disk space for multiple deployments in the same shared location.

Requirements for a System Running AutoCAD Software

The computer that actually runs AutoCAD must meet the following system requirements:

Hardware/Software	Requirement	Notes
Operating system	Windows XP Professional Windows XP Home Windows 2000 Windows NT 4.0 with SP 6a or later	It is recommended that you install and run AutoCAD on an operating system in the same language as your version of AutoCAD or on an English version of the operating system. You must have Administrator or Administrator equivalent permissions to install AutoCAD.
Web browser	Microsoft Internet Explorer 6.0	NIW will install AutoCAD without installing IE 6.0. This is not recommended.
Processor	Intel® Pentium® III or later 500 MHz (minimum) 800 MHz (recommended)	
RAM	128 MB (minimum) 256 MB (recommended)	Additional memory directly improves performance.
Video	1024 x 768 VGA or higher	Requires a Windows-supported display adapter.
Disk space	300 MB free	Sufficient swap space is also required to handle installation as well as any data or drawing files saved.
Pointing device	Mouse, trackball, or other device	Wheel mouse is recommended.
Network Interface Card (NIC)	Compatible with existing Ethernet networking	

Hardware/Software	Requirement	Notes
	infrastructure	
CD-ROM drive	No specific requirement	

General Notes:

- The AutoCAD software program benefits most from additional memory.

Planning Your Installation

The first step to a successful AutoCAD installation in a network environment is to create a plan. Your plan should identify your network environment and how AutoCAD software will be installed. Start by answering the following questions:

1. What network operating systems are running? What are the versions of the network operating systems? Do these versions meet the requirements to run AutoCAD software and the NLM?
2. What protocols are running on the network?
3. Where will the NLM be installed? How will it be configured?
4. Which workstations will run AutoCAD software? Does each workstation meet the AutoCAD system requirements? Does the workstation hardware, operating system, or network client need to be upgraded?
5. Can the workstations communicate with each other and with the server where the NLM will be installed?
6. Will a stand-alone or network client version of AutoCAD software be installed? Is some combination of stand-alone or network client installation necessary?
7. Will the deployment used to install AutoCAD be customized? What type of customization? Support paths modifications? Additional files? Will additional files be on the server or workstation?
8. Where will the deployments used to install AutoCAD software be located? Identify the workstation that will be used to create the deployments. Can workstations connect to this location?
9. What tests will be used to verify that AutoCAD software is installed and running correctly?

The answers to these question help you determine how the NLM will be installed, how deployments will be created, and ultimately how AutoCAD software will be installed on the local workstations. The following sections discuss each piece needed to install and run AutoCAD software over a network.

Autodesk Network License Manager

The Autodesk NLM manages the distribution of licenses to workstations that run network versions of AutoCAD. If you are running FLEX/m versions earlier than version 8.3, we recommend that you update to version 8.3 supplied with AutoCAD 2004.

Note: The license files used with earlier FLEX/m versions do not need to be updated. Also, FLEX/m cannot distribute licenses to versions of AutoCAD 2000i and earlier. FLEX/m supports TCP/IP; it does not support IPX.

For the NLM to distribute licenses, it must be installed, authorized, and started on a Windows NT 4.0 workstation or server, Windows 2000 Professional workstation or server, or Windows XP Professional. For instructions about how to install, configure, authorize, and run

the NLM, see the second white paper in this series, "Installing the Autodesk License Manager for AutoCAD 2004 or AutoCAD 2004-Based Products."

The NLM can be configured in any of the following three license manager options:

- Single Server
- Distributed Server Pool
- Redundant Server Pool

Configuration Option 1: Single Server

In this configuration, FLEXlm is installed on a single server, and all license activity is restricted to this server. In a single server configuration, you have the advantages of a single point of administration and only a single point of failure. This configuration's disadvantage is that, if the server fails, AutoCAD clients will not run until the server is back on line.

Configuration Option 2: Distributed Server Pool

In this configuration, FLEXlm is installed on multiple servers to create a "pool" of licenses. Each server is configured for a specified number of licenses. AutoCAD software automatically tries every server until a license is granted or the end of the "pool" is reached. The order in which the servers are searched is specified by the environment variable ADSKFLEX_LICENSE_FILE. One of the new features of the NIW is to automatically set the environment variable when running in a distributed server pool environment. In a distributed server pool configuration, you have the advantages of load sharing and fault tolerance: if a server fails, other servers are available to distribute licenses. This configuration's disadvantage is that when a server running the NLM fails, fewer licenses are available for use.

Configuration Option 3: Redundant Server Pool

In this configuration, FLEXlm supports a three-server redundant server pool running on Windows NT 4.0 Server or Windows 2000 Server. All three servers must be on the same local subnet. A quorum (two servers) must be running to administer licenses. In a redundant server pool configuration, the major advantage is complete fault tolerance: all licenses are still available if a single server should fail. This configuration's disadvantage is that the servers must be close together (on the same subnet).

AutoCAD software and the NLM must be able to communicate with each other. AutoCAD uses the following general process to communicate with the NLM.

- No matter which configuration option is used, starting AutoCAD software sends a broadcast message across the network to the server or servers specified in either the *licpath.lic* file or the ADSKFLEX_LICENSE_FILE environment variable.
- The FLEXlm server responds to AutoCAD with the location for the NLM's vendor daemon (*adskflex.exe*). (The license manager daemon is a service configured under Windows that recognizes *all* vendor daemons running on that server.)
- AutoCAD software then establishes communication with the NLM and requests a license.
- The NLM checks whether a license is available in its license pool. If a license is available, the NLM grants the request and AutoCAD starts; if no license is available, the NLM denies the request.
- While AutoCAD software is running, it maintains a "heartbeat" with the NLM. If communication between AutoCAD and the NLM is lost, the NLM frees the license after a specified amount of time. AutoCAD software then displays an error message stating the

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number of minutes remaining until it will shut down and allows the user to save work. A new feature of AutoCAD 2004 is the ability to set a license timeout period. When set, license timeout returns a license to the license pool when a connection with the workstation is lost, or if a license is checked out but AutoCAD is idle on a workstation for longer than the timeout period defined.

- If a license is not available when AutoCAD requests one, the NLM sends a message to try again later; AutoCAD software will not start until a license becomes available.
- If a license manager is not found when requested, AutoCAD returns an error message stating that the program cannot run until the NLM is set up and running on the network.

You can configure the NLM to reserve or exclude licenses for an individual user, a certain workstation, or a group of users or workstations. Both reserving and excluding licenses are controlled through an options file.

When installing AutoCAD software through a deployment created by the Network Installation wizard, AutoCAD will search for the NLM based on server configuration specified when the deployment was created. The deployment correctly configures either the *licpath.lic* file or the environment variable `ADSKFLEX_LICENSE_FILE`.

FLEXlm technology supports multiple network adapters installed on the same server. The FLEXlm program also allows a server to connect to an Internet Service Provider (ISP) without affecting the distribution of licenses.

Network Installation Wizard

The NIW creates an installation image (called "deployments") to install AutoCAD software on a workstation. The deployment created is either a network client deployment, requiring the presence of an NLM, or a stand-alone deployment. In AutoCAD 2004, the wizard has been enhanced to allow AutoCAD support paths to be setup, custom files to be added, and express tools to be installed. The Network Installation wizard no longer installs the Autodesk NLM.

Note: The ability to create a deployment that installs a stand-alone AutoCAD version makes it possible to install AutoCAD 2004 on a workstation where you already own a license. You can create a deployment so that you do not have to visit each workstation to install the software.

For instructions about how to create deployments, see the third white paper in this series, "Creating Deployments for AutoCAD 2004 or AutoCAD 2004-Based Products."

Installing AutoCAD Software

In AutoCAD 2004, there are two ways to install and run AutoCAD software.

- Stand-alone installation
- Network client installation

Stand-Alone Installation

In a stand-alone installation, AutoCAD software is installed on the local workstation. The stand-alone installation does not require that the workstation be connected to a network in order to run. In this type of environment, each workstation running AutoCAD software requires the purchase of a separate AutoCAD license.

Outside the United States and Canada, the AutoCAD stand-alone version uses a software lock.

Network Client Installation

In a network client installation, AutoCAD software is installed locally on the workstation but requires the workstation to be connected to a network. Somewhere on the network an NLM must be installed, authorized, and running to grant licenses. The benefit of the network client installation is that the AutoCAD licenses can be moved around (or “floated”) among workstations while maintaining the performance of a stand-alone installation. The floating license does not require you to purchase a copy of the AutoCAD program for every workstation that might run AutoCAD. You can purchase just the number of licenses you need and install AutoCAD on all workstations. The NLM ensures that only a specified number of licenses are in use at any given time.

With the inclusion of FLEXlm version 8.3 in AutoCAD 2004, license borrowing is possible. A network client installation of AutoCAD can borrow a license from the NLM. The license is borrowed for a specified amount of time and is returned when the computer is reconnected to the network.

AutoCAD 2004 Network Installation Wizard Enhancements

There are many new enhancements to the AutoCAD NIW that help customize either a stand-alone installation or network client installation. They are:

- Ability to create MSI administrative images or modify existing MSI administrative images
- Ability to apply a patch (service pack) to a deployment
- Ability to tell AutoCAD software where to find the NLM without having to visit the workstation where AutoCAD is installed
- Ability to specify whether installations based on the deployment can proceed if Microsoft Internet Explorer 6.0 or later, is not installed on the workstation
- Ability to specify the default profile name used by the AutoCAD application
- Ability to install AutoCAD® Express Tools
- Ability to modify search paths and file locations used by the AutoCAD software application. They include:
 - Support file search path
 - Menu file path
 - Custom dictionary file path
 - Alternate font file
 - Font Mapping file
 - Printer Support file path
 - Drawing template file location
 - Default Template file for QNew command
 - Tool Palettes file locations
 - Temporary External Reference file location
 - i-drop Associated file
- Ability to install additional files
- Ability to enable live updates and how live updates will be received
- Ability to disable DesignCenter™ Online

About the Server

Network versions of AutoCAD software require that the TCP/IP protocol be configured on the workstation and on the server in order for AutoCAD to communicate with the NLM. The term *server* is used here to represent the computer where the NLM resides. It is also used for the computer where deployments will be stored.

Dynamic Host Configuration Protocol (DHCP) servers may be used to assign TCP/IP addresses for workstations running the NLM and AutoCAD software.

About the Workstations

The workstations running AutoCAD software must meet the AutoCAD system requirements and must be configured using TCP/IP protocol.

Planning in More Detail

This section presents detailed answers to each of the questions related to planning a network installation. These details help you determine how the NLM will be installed, how deployments will be created, and ultimately how AutoCAD software will be installed on the local workstations.

1. What network operating systems are running? What are the versions of the network operating systems? Do these versions meet the requirements to run AutoCAD software and the NLM?

AutoCAD supports only a Windows networking environment. In order to use the NLM, you must install it on a Windows NT 4.0 server or workstation, a Windows 2000 Professional workstation or server, or Windows XP Professional. If you plan to use Windows NT 4.0, you must use Service Pack 6a or later. If you want to create a redundant server pool, you can use only the server versions of Windows NT 4.0 and Windows 2000.

To run the AutoCAD software program, you must run one of the Windows operating systems listed in the system requirements table.

You can use Novell or UNIX servers only for file storage. The NLM and AutoCAD software must be installed on a Windows workstation or server.

Note: It is important that you use the correct software to connect to your Novell or UNIX server. With earlier versions of AutoCAD software, there have been reports of problems opening drawings stored on a Novell or UNIX server. The problems are usually related to the version of the client connection software used. If you encounter such a problem, contact the manufacturer of your connection software to find out any known issues with AutoCAD that may be addressed by a later release of the Novell client software or UNIX client software.

2. What protocols are running on the network?

AutoCAD supports only TCP/IP in a networked environment. Although you may have other protocols running on the network, each workstation and server must be correctly configured for TCP/IP.

3. Where will the NLM be installed? How will it be configured?

Identify a computer or computers that will run the NLM; verify that the computer or computers meet the NLM system requirements. The server should be able to communicate with each workstation running AutoCAD software; likewise, each workstation should be able to communicate with the server.

Identify the type of NLM configuration that you will use: single server, distributed server pool, or redundant server pool. A single server is the most flexible and easiest to administer, but no fault tolerance is provided. A distributed server pool provides fault tolerance and allows load-balancing across a network. A redundant server pool provides complete fault tolerance but is limited to Windows server operating systems, and the servers must be close to each other.

4. Which workstations will run AutoCAD software? Does each workstation meet the AutoCAD system requirements? Does the workstation hardware, operating system, or network client need to be upgraded?

If a workstation does not meet the system requirements, or if it needs to be upgraded, save yourself and your users time and trouble by doing that *before* trying to install and run the AutoCAD program.

In AutoCAD 2004 software, a user no longer has to be a member of the Power-Users group or local Administrator group in order to run AutoCAD. A user must be an administrator or administrator equivalent in order to install AutoCAD 2004.

5. Can the workstations communicate with each other and with the server where the NLM will be installed?

A quick test of communication on your network is to “ping” each workstation and server. If you cannot ping a computer by host name, the TCP/IP protocol or DNS services are not correctly configured. Consult your operating system instructions and network adapter documentation about configuring TCP/IP. Communication problems between the workstation and server or between the server and workstation are the primary reason that AutoCAD software will not run in a network environment.

Note: When you test, you should be able to ping in both directions. PING is a command-line utility that allows you to specify a host name or IP address. Use the host name in your test. If communication is working correctly when you ping using host name, the IP address of the host name specified will be returned.

6. Will a stand-alone or network client version of AutoCAD software be installed? Is some combination of stand-alone and network client installation necessary?

The answers here determine whether you visit each workstation to install AutoCAD software and how many (if any) deployments you create. Most offices will benefit from a combination of stand-alone and network client installations.

If you install stand-alone versions of AutoCAD software, you can either visit each workstation with a CD or install AutoCAD using a deployment created by the Network Installation wizard. If you create a deployment to install stand-alone versions, you must ensure that you do NOT install AutoCAD software on more computers than you have licenses for.

Note: The deployment will use the same serial number on all computers.

To install a network client version of AutoCAD software, you must create a deployment. There is no limit to the number of deployments you create.

7. Will the deployment used to install AutoCAD be customized? What type of customization? Support paths modifications? Additional files? Will additional files be on the server or workstation?

The answers to these questions depend on your company and whether any CAD or drafting standards are in place. The NIW allows modifications of existing deployments. A base deployment can be customized to include additional files, such as LISP routines, standards drawing, plotter support paths, and customized menus. The deployment can be customized

to include different support paths. Customization of this type is applied to the workstation at installation time.

If additional files are to be added to a server, the work must be performed outside of the NIW. The deployments can then be modified to include the paths to the network drives where the customized files are stored. When AutoCAD is installed it will then have access to these additional files.

8. Where will the deployments used to install AutoCAD software be located? Identify the workstation that will be used to create the deployments. Can workstations connect to this location?

The deployments should be on a server with sufficient disk space. The NIW can modify and create multiple deployments from the same administrative image thus allowing the CAD manager or network administrator to customize deployments in multiple ways to meet their user's needs. Deployments are a one-time installation per workstation, so they do not need to be on your best server.

You should not remove the deployments after all workstations have been installed. You may need the deployments in the future.

9. What tests will be used to verify that AutoCAD is installed and running correctly?

A successful plan for installing AutoCAD software must include a set of tests to ensure AutoCAD is running correctly on the workstation. At minimum, you should start AutoCAD software and verify that it requests a license from the correct server. You should also open and plot several drawings, both off the local workstation and a network drive. In addition, test any custom LISP routines or VB applications that you use. If you have added additional support paths through the NIW, make sure AutoCAD sees these additional paths. While not usually required, it is good practice to restart your computer before launching AutoCAD for the first time.

The worst thing you can do as a CAD manager or network administrator is to have a successful installation of AutoCAD software but not be able to open or plot drawings. Keep in mind that this is your users' first experience with AutoCAD 2004. Help them get started right.

Conclusion

Now that you have been introduced to networking AutoCAD 2004, continue by reviewing the second white paper in this series, "Installing the Autodesk License Manager for AutoCAD 2004 or AutoCAD 2004-Based Products." If an AutoCAD 2004-based product license manager is already running on your network, continue by reviewing the third white paper in this series, "Creating Deployments for AutoCAD 2004 or AutoCAD 2004-Based Products."

The key to a successful AutoCAD installation starts with good planning. You have achieved a successful installation if your license manager is installed, configured, authorized, and running, and AutoCAD acquires a license from the NLM.

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