

Creating a Deployment Roadmap



Planning your deployment project is an important step in the logical progression of implementing Microsoft® Windows® 2000. Because Windows 2000 is designed to be deployed incrementally—based upon the specific business needs and information technology (IT) capabilities of any size organization—you need to decide which features are appropriate for your organization. You also need to consider the technical and project management dependencies of the Windows 2000 features you have chosen to deploy. And, finally, you need to consider the interoperability or coexistence requirements of your existing IT environment.

This chapter presents an overall project management process and identifies key deployment phases to help you create a project plan—a roadmap—for your team to follow when deploying Windows 2000 in your organization.

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Chapter Goals

This chapter will help you develop the following planning documents:

- A project plan.
- A project management process appropriate for your organization.

Related Information in the Resource Kit

- For more information about developing your deployment project plan, see “Planning for Deployment” in this book.
- For more information about how to run a successful Windows 2000 pilot project, see “Conducting Your Windows 2000 Pilot” in this book.
- For more information about designing a test lab and evaluating Windows 2000 features, see “Testing Windows 2000 in a Lab Environment” in this book.

Creating a Project Plan

Creating a project plan for deploying Windows 2000 ensures a successful deployment. Although you will create a project plan that will uniquely meet your business and IT requirements, there are common elements that need to be included in your plan for it to be an effective roadmap for your project. This chapter focuses on integrating preliminary technology decisions into a project management plan that you can use to deploy Windows 2000. For more information about specific project management issues to consider when preparing your project plan, see “Planning for Deployment” in this book. Figure 2.1 illustrates some steps you can use to create a project plan.

Start

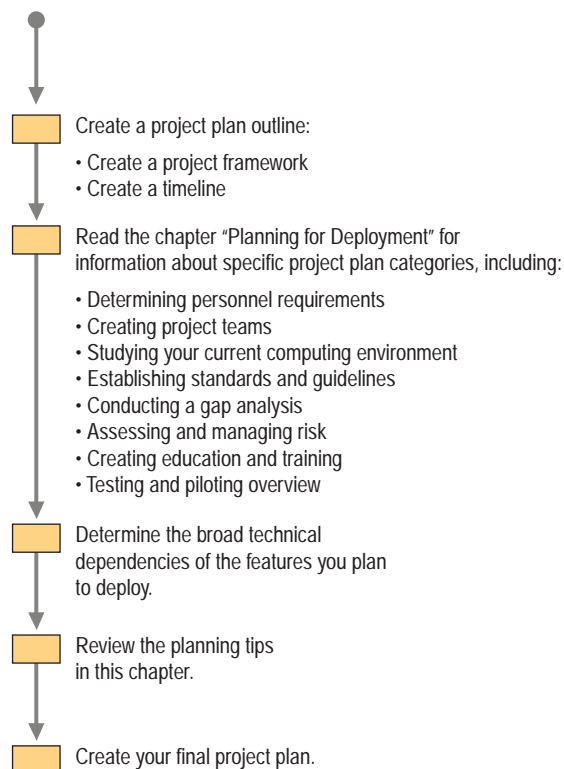


Figure 2.1 Creating a Project Plan

Used effectively, a project plan can clearly identify specific phases of your deployment process and provide a clear and functional roadmap. While it is not necessary to follow a deployment process in a prescriptive manner—as you would an installation procedure—an infrastructure deployment process provides a conceptual framework for your Windows 2000 deployment project and makes it easier for your deployment teams to assess progress.

Many organizations already have project management methods and structures in place. To maximize the success of your deployment, follow a project management structure that is appropriate for your organization. The following sections outline a sample project management structure and then describe the project management structures used by two sample companies.

As you read through this chapter, you will find references to your deployment team, project planning documents, creating and using a test lab, and piloting Windows 2000. Table 2.1 is a list of the chapters in this book that contain additional information to assist you in developing your project plan.

Table 2.1 Deploying Planning Information Contained in this Book

Chapter	Description
Planning for Deployment	Contains information about analyzing your current computing environment, conducting a gap analysis, personnel requirements, planning tasks, deployment planning documents, capacity planning, risk assessment, and education and training.
Building a Windows 2000 Test Lab	Contains information about designing, building, and managing a test lab; testing for deployment; and testing after deployment.
Conducting Your Windows 2000 Pilot	Contains information about how to run a successful Windows 2000 pilot project.
Testing Applications for Compatibility with Windows 2000	Contains information about testing applications (both custom and retail) for compatibility with your Windows 2000 configuration.

Preparing Your Project Planning Process

Every deployment project goes through a life cycle—a process that includes determining IT goals and objectives, designing and developing features, conducting a pilot project, and installing the new operating system in your production environment. The principal function of a project planning process is to establish the order that your deployment team specifies, implements, tests, and performs the required activities.

Figure 2.2 illustrates a sample project management process for deploying Windows 2000. Each phase is listed at the top of the figure. The main body of the figure contains tasks you need to accomplish during the various phases of deployment and gives suggestions of Windows 2000 technologies you might consider for deployment.



Figure 2.2 Sample Project Management Process for Windows 2000

The two bars near the bottom of the figure refer to a test lab. Testing is an integral part of Windows 2000 deployment that you will use throughout the whole deployment process.

Each of the four project management steps illustrated in Figure 2.2 is described in the following sections.

Determining Goals and Objectives

During this phase, evaluate Windows 2000 features in relation to the needs of your organization. This is also the time for you to secure executive sponsorship and funding, create focused goals and objectives, and put together a deployment team.

Finally, begin using your test lab to investigate Windows 2000 features.

The first milestone is executive sign-off on the overall plan for deploying Windows 2000 in your organization. When defining your plan, outline the high-level business and IT goals of your deployment to provide a clear direction for implementation. Also, clearly define which features of Windows 2000 will be included during various phases of your deployment.

Some questions to answer during this phase include:

- Why is your organization deploying Windows 2000?
- What business benefits will your organization derive from Windows 2000?
- What IT benefits will your organization derive from Windows 2000?
- What are the differences between your organization's current IT environment and where you want to be?
- When does this project need to be completed and what is the time line?
- What is in-scope and out-of-scope for this project?
- Who are the users affected by this project?
- What are the critical success factors?
- What are the risks?
- Which groups, organizations, and individuals will be involved in the process?

Some of the documents you might create for this milestone include:

- Goals and objectives document.
- Outline of current environment, including user profiles.
- Risk assessment.
- Gap analysis.

For more information about risk assessment and gap analysis, see "Planning for Deployment" in this book.

This phase is important for creating your deployment roadmap. After defining your goals, it is easier to determine the Windows 2000 features you need, and how these features relate to your existing environment. Your analysis can also help you understand critical technology dependencies. While you need to be thorough in your assessment, this phase can be accomplished in a short amount of time. A goals and objectives phase helps you develop a project vision that is shared by the IT department, end-users, and management, and helps create a successful deployment.

Note Your organization might have already completed this phase, either formally or informally. If management has already made a decision to deploy Windows 2000, you still need to create a goals and objectives document and get formal sign-off before moving to the feature design and development phase.

Feature Design and Development

During the feature design and development phase, you create the actual design—sometimes called the functional specification—for the Windows 2000 features you intend to implement in your organization. This is also the time to determine how the features you have selected will actually work in a production environment. The technical dependencies of Windows 2000 features become more important during this phase, so it is important that the various deployment teams collaborate and share insight into the capabilities, functionality, and interdependencies of each feature. The technical design chapters in the remainder of this book will help you determine how to deploy specific features in your organization.

The functional design specification is the complete set of designs that you will test and refine. For example, you might have multiple design variations of your Microsoft® Active Directory™ namespace based on different business or IT requirements, each of which will be evaluated against business and IT criteria appropriate to your organization. Eventually, through technical testing and analysis, you will be ready to implement one Active Directory namespace for your organization. It is important to remember that this process and its results are specific to your organization.

The iterative design and testing process starts in this phase as each of your deployment teams creates their own plans and then synchronizes with each other to create a comprehensive design specification. Your test lab is also important during this phase as you test various configurations to determine how to use Windows 2000 features to meet your project objectives.

The functional design specification needs to provide your project teams with enough details about the features and functions your organization will deploy to help them easily identify resource requirements and commitments for implementing your Windows 2000 infrastructure.

During this phase, also create a project plan that contains the functional specification (the combined plans of each team) and a schedule. You will be ready to implement your project plan after you receive management approval to proceed with the deployment. Some primary deliverables you can include in your plan are:

- Functional design specification
- Updated risk management plan
- Master project plan and master project schedule
- Features plan, listing which features are in and out of scope

Windows 2000 Pilot

After you have completed your feature design and development, and thoroughly tested your feature configurations, you are ready to conduct a pilot project. The deployment team needs to set a number of interim delivery milestones, each of which involves solutions development, testing, validating against prespecified performance criteria, and redesign. Tracking deployment issues and efficiently resolving them is vital to reaching your deployment goals while remaining on schedule and within budget.

After your pilot project is running and stable, your sponsor and the deployment team can meet to assess the functionality of the new Windows 2000 infrastructure and verify that production rollout and support plans are in place. During this phase, primary milestones and deployment documents can include:

- Technology validation complete
- Complete and stable functional specification
- Proof-of-concept complete
- Preproduction test complete
- Pilot complete
- Updated risk management plan

Additional deployment documents you might want to develop include:

- Training plan
- Support or helpdesk plan
- Operations transfer plan
- Disaster recovery plan
- Tools list

During this phase, you will adjust your designs based upon pilot testing. You will notice changes that need to be made because you are integrating the designs of each feature you will deploy and then testing those designs to ensure appropriate integration.

For more information about validating and testing your Windows 2000 Server deployment plan through proof-of-concept lab testing and a pilot, see “Building a Windows 2000 Test Lab” and “Conducting Your Windows 2000 Pilot” in this book. For more information about testing applications compatibility with Windows 2000 Professional, see “Testing Applications for Compatibility with Windows 2000” in this book.

Production Rollout

The final phase of your Windows 2000 project is production rollout. At this point, you have tested all of your designs in the lab and conducted a pilot program to refine your plan and further test your designs. Now you are ready to incrementally deploy Windows 2000 throughout your enterprise. For some companies, the initial pilot project is the first phase of their rollout. Others might remove their pilot project installations and start their production rollout with clean installations.

During the production rollout phase, testing and support activities are still important as iterative cycles of deployment, testing, validation, and support become the primary focus. The new Windows 2000 Server and Windows 2000 Professional infrastructure is formally turned over to the operations and support groups at the deployment complete milestone. Now is the time to conduct a project review. Primary milestones and deployment documents that you might want to consider creating during this phase include:

- Production rollout plan.
- Release plans for Windows 2000 Server, Windows 2000 Professional, or both.
- Operations and support information system (knowledge base, procedures, and processes for performance support, including test results and testing tools).
- Load or image set and installation scripts.
- Documentation repository (hard and electronic copies of all project documents, including deployment notes, are archived).
- Training material for end-users, administrators, helpdesk, and operations staff.
- Project closeout report.
- Disaster recovery plan.

After your deployment is complete and you have prepared your project closeout report for the executive sponsor, you might decide to conduct a project review. You can use a project review to objectively assess the strengths and weaknesses of your entire project and analyze how you could improve on future infrastructure deployments with the knowledge you have gained from hands-on experience.

Deployment Scenarios

Each company will create a unique project plan based on its own business needs and the project management procedures. The following scenarios provide samples of how goals and objectives were translated into milestones and performance criteria for several enterprise-scale organizations. These scenarios are based on the experiences of companies who participated in the Joint Development Program for Windows 2000.

Scenario 1: Multinational Financial Services

This organization has nine distinct operating companies, each with its own IT organization, and no common IT standards. As an organization, they experience problems with security policies, domain structure, and network configurations. Most of their servers are currently running Microsoft® Windows NT® Server 4.0. The key objectives they want to accomplish are to create:

- A new IT environment with Windows 2000 functionality.
- A common directory for all nine operating companies.

The deployment team identified several key issues that define how they stage their deployment, as follows:

- Phase 1: Assessment
- Phase 2: Design and Engineering
- Phase 3: Testing
- Phase 4: Migration (Deployment)

Phase 1: Assessment

During the assessment phase, IT management from each company agrees on the need for a common namespace. Although several Domain Name System (DNS) names are already registered by and for each of the operating companies, the challenge is to find one name to use as the root name for all companies. This single “placeholder” name needs to meet the following criteria:

- Accurately define the root of the tree for all nine operating companies.
- Be new to the organization (never been used by any of the operating companies, either internally or externally).

IT management defines global engineering teams that are split into eight working groups based on plans for a basic configuration that can be tested, modified, and customized for each operating company. Table 2.2 shows the deployment teams and their responsibilities.

Table 2.2 Deployment Planning Teams

Deployment Team	Focus
Server and Infrastructure Design	Responsible for overall design, design iterations, and final engineering.
Active Directory	Domain and tree design below the main domain level and ongoing management of Active Directory in their respective domains, especially as they relate to security and administrative privileges.
Mobile and Desktop Design	Develop Windows 2000 configurations for all desktop and portable computers and determine the appropriate Group Policy and Microsoft® IntelliMirror™ features to use for managing those configurations.
Security	Permissions, group memberships, and administrative delegation (provide input to Active Directory group on organizational unit design).
Migration	Migrating Windows NT Server 4.0 to a Windows 2000 Server environment. Focus on interoperability, migration, and coexistence during the interim period of parallel domains until migration is complete.
Certificate Services	File encryption and PKI.
Free Seating	Develop Windows 2000 configuration for free-seating clients and determine appropriate Group Policy and IntelliMirror features to use for managing those configurations.
Application Management	Ensure that all in-house applications are Windows 2000 Logo-compliant. Determine the best deployment vehicle to use for desktop and portable computers (through an in-house developed push application or Windows 2000 installation tools). Determine shared run-time components. Study system file protection mechanisms. Run existing applications side-by-side for minimal maintenance.

The team determines that the business and IT needs will be principally met through the following:

- Active Directory
- New domain design
- IntelliMirror
- Distributed File System
- Disk Quota Management
- Remote OS Installation
- Synchronization of Active Directory with Exchange directory services

Phase 2: Design and Engineering

The primary issue during this phase is to decide whether the domain root name needs to be visible or accessible through the Internet or available only internally. An Internet presence already exists for the entire group of operating companies, so the intranet name needs to be different. An internal root name is created as a placeholder name so that individual domains can be created for each of the nine operating companies. Each company retains autonomy in areas such as configuration creation, management, and security.

They also use this phase to design and test the configuration for each feature. Then, the teams work together to determine how the selected Windows 2000 features affect each other. They also create training documentation and start developing a support plan.

Primary Goals

As the driving force behind the migration to Windows 2000, Active Directory and domain design need to meet the following business and IT criteria to be acceptable for all operating companies:

- One root domain is necessary so that all operating companies can participate in a common directory.
- Each business unit wants to retain complete administrative control of its entire organization, including all separate Windows NT Server 4.0 domains and structures, and to be totally independent of any other operating company.
- Domain and directory design has to be flexible enough to allow for company acquisitions, divestitures, and reorganization of existing operating companies.
- Each operating company is responsible for its own domain and everything below it based on that operating company's specific needs.

As the Active Directory design is developed, the migration team needs to consider issues of computer cloning versus computer upgrade. Computer cloning is a process in which you create one installation and configuration for new operating system installations and then copy that configuration to all new computers you install. Because the namespace decisions are so important to meeting the company's goals, a namespace design board is formed with representatives from the IT groups of each operating company. The senior management of the board and the IT organizations of each operating company need to agree on the final namespace design. The namespace design factors they consider include:

- Impact on Windows 2000 domain model
- Impact on existing Windows NT Server 4.0 namespace
- Conflicts with the existing DNS namespace

The company considers both domain design and DNS to be critical decision points when upgrading from Windows NT Server 4.0 to Windows 2000 for two reasons:

- If the proposed Windows 2000 domain structure mirrors the existing Windows NT Server 4.0 domain structure, then they can upgrade directly from their Windows NT domain to their Windows 2000 domain.
- If they decide to use the same Windows 2000 domain structure they used in Windows NT Server 4.0, then they need to have two parallel domain structures. They also need to keep the Windows NT environment until they have stabilized the new Windows 2000 environment.

The team determines that the upgrade or migration decision will be dictated by:

- The existing domain structure
- The existing functionality
- New functionality that they will implement because of Windows 2000

The team then realizes that deciding what will exist in each domain requires analysis of the following items:

- Assessing the problems in their current Windows NT Server 4.0 domain design.
- Deciding which Windows NT Server 4.0 features they want to continue in the Windows 2000 domain design.
- Deciding which new features of Windows 2000 they want to implement based upon their added value to the new domain structure.
- Determining if they have a native Windows NT Server 4.0 environment, or if it has been modified or customized (either by in-house development teams or a third-party solution provider or developer).

For example, this organization uses an in-house scripting tool that associates users with specific applications. This tool performs application publishing similar to Windows Installer in Windows 2000, so a decision needs to be made whether to continue using the in-house tool or to use Windows Installer. Using Windows Installer would reduce internal development costs and thereby reduce total cost of ownership (TCO). As a result, they decide to use Windows Installer.

For more information about Active Directory domain design, see “Designing the Active Directory Structure” in this book. For more information about domain migration, see “Determining Domain Migration Strategies” in this book.

Secondary Goal

Their secondary goal is to determine other features of Windows 2000 that are beneficial to their environment, but which might not be features of Windows NT Server 4.0. Then, they develop a plan to determine if the new features are appropriate for their environment. For example, this sample organization decides that the following features meet their business and IT needs:

Offline Files Portable computer users can have access to network data when traveling by having personal and network files on their local computers. For nontraveling end-users, this feature helps ensure continuous end-user productivity if the LAN or WAN has service interruptions, because files are stored on the user's local hard-drive.

Fault-tolerant Distributed File System With Distributed file system (Dfs), they can create a single directory tree that includes multiple file servers and file shares for a group, division, or enterprise. This allows users to easily find files or folders distributed across the network. Having a fault-tolerant Dfs is linked to roaming user profiles, which are already in use through their Windows NT Server 4.0 infrastructure. Files can be stored on the network, providing improved replication among the company's partners.

Disk Quota Management Disk quota management allows the company to use volumes formatted with the NTFS file system to monitor and limit the amount of server disk space available to individual users. They can also define the responses that result when users exceed the specified thresholds. In the past, the organization used third-party tools. They are moving to Windows 2000 native tools in an effort to reduce in-house development costs and total cost of ownership (TCO).

Remote OS Installation An enhanced scripting process for installation already exists in this organization, but scripts must be updated every time the basic client computer configuration changes. They will use Windows 2000 Remote OS Installation to deploy Windows 2000 Professional for first-time installations, and also use Remote OS Installation for rapid updates of malfunctioning computers. They plan to use Remote OS Installation in conjunction with IntelliMirror to accelerate and simplify computer replacement, resulting in reduced TCO.

Exchange directory service with Active Directory integration

This organization plans to synchronize Exchange 5.5 directory using the Active Directory Connector (ADC), and eventually integrate the directory services when the organization upgrades to the next version of Exchange.

Phase 3: Testing

This sample organization set up a test lab for feature and pilot testing. They want to simulate the actual conditions of their production migration. After the lab and pilot tests validate the migration process, the organization will be ready to begin the production rollout. The preliminary design pilots will be rolled out to IT personnel during the design phase so they can test and refine the designs.

The initial design issues they plan to test and evaluate include:

- Active Directory design (placeholder domain and four child domains).
- Standard client configuration.

Their pilot objectives include:

- Evaluate Windows 2000 and the proposed Active Directory model in a real production environment.
- Use new technology that is native to Windows 2000 as much as possible.
- Merge the standard client stationary and mobile configurations.
- Demonstrate the proposed future configuration to business units throughout the organization and collect constructive criticism.
- Consolidate and refocus isolated Windows 2000 projects within the entire organization.

During this phase, the deployment team redesigns and tests until consensus is reached.

The new design needs to meet the following acceptance criteria:

- Increases stability
- Provides an improved working environment
- Can be managed with current and new or additional administrative resources
- Meets budget requirements

After the domain design is tested and finalized, each global engineering team within the organization will sign off on the domain design. Then, the design must be approved by higher IT management through all nine operating companies.

Phase 4: Migration

Because the organization finds it necessary to maintain Roaming User Profiles for mobile users, they decide to maintain two parallel environments throughout the transition period. Many roaming users who upgrade to Windows 2000 at home will find that their work environment has not yet upgraded. By maintaining parallel environments, the infrastructure will support all users and allow them to access their files, regardless of which operating system they are using.

However, migration needs to occur as quickly as possible. The organization plans to maintain the dual Windows NT Server 4.0 and Windows 2000 environment for 12 to 24 months. Users will be able to remain in both environments until the IT environment in all nine operating companies is completely transitioned to Windows 2000.

For this organization, collapsing the Windows NT Server 4.0 environment is the most critical decision point for their entire migration. They want to be sure that they perform adequate lab and pilot testing to alleviate any significant problems that can arise as a result of improper design. By performing adequate testing, they hope to avoid causing network downtime. After they complete testing, they will proceed with migrating to Windows 2000 throughout the operating companies and then collapse the Windows NT Server 4.0 environment.

Scenario 2: Multinational Consumer and Industrial Manufacturer

Scenario 2 is based on a highly decentralized business organization with a distributed IT environment comprised of 175 separate operating companies. Manufacturing and assembly take place in 49 countries on six continents. They employ approximately 390,000 employees worldwide who speak approximately 120 different languages. A common interface and implementation process is required to ease transition for all of the operating companies and to reduce deployment support costs. All of the operating companies want to address the following common issues:

- Provide customers with easy access to a common set of knowledge relevant to the company and its business.
- Reduce IT administration costs and improve service by creating one forest.
- Consolidate Windows NT 4.0–based servers for upgrading.
- Provide a common IT environment for all of the operating companies.
- Set guidelines for Windows 2000 deployment throughout the organization that will provide a stable IT environment and prevent individual groups from deploying separate products or features that are not supported by the central IT department.
- Communicate IT issues throughout all operating companies.
- Design Active Directory effectively because it enables many other Windows 2000 features.

Deployment Teams

The organization creates a deployment team consisting of both a server and a client team. Each team has representatives from each of the primary operating companies. Their goal is to develop a model for both server and client operating environments that can be used and applied at all of the operating companies. As such, their goal is to establish and validate a design and deployment process that can be used by all of the operating companies rather than to deploy Windows 2000 in a production environment. They divide their plan into three phases:

- Phase 1: Infrastructure backbone design and development
 - Establish core services for the primary corporate domain
 - Deploy servers in major corporate offices

- Phase 2: Deployment planning at the operating companies
 - Establish pilot domains in all operating companies
 - Configure sites and site-link bridges
 - Create user accounts
 - Establish trusts between Windows NT Server 4.0 and Windows 2000 domains
 - Pilot Windows 2000 Professional in multiple operating companies
- Phase 3: Migrate primary services from Windows NT Server 4.0 to Windows 2000 Server
 - Windows Internet Name Service (WINS)
 - Dynamic Host Configuration Protocol (DHCP)
 - Print
 - Web servers using Windows Internet Information Services (IIS)

One of the first tasks the team accomplishes is creating a list of the primary concerns and risks for the overall project. This list includes:

- Recognize that the coordination required to build a global enterprise is unprecedented. (It takes an average of three years to deploy an operating system for both servers and clients throughout all operating companies.)
- Prepare for coexistence with UNIX and mainframe line-of-business applications, as required. (For example, many operating companies have Sun RISC 6000 Servers containing an accounting program running on the Windows NT Server 4.0 operating system.)
- Provide tools to move and merge parts of the forest, when necessary, based on internal company changes and frequent acquisitions, mergers, and divestitures.
- Fill the position for a first domain administrator who is:
 - Responsive to change requirements and root domain support.
 - Able to effectively delegate child domains and site creation.
- Recognize that a single schema might not meet the configuration requirements for all operating companies; therefore, a directory synchronization tool might be required for interoperation among the companies.
- Recognize corporate Internet Protocol (IP) dependencies, such as:
 - Firewalls
 - Network performance

The Server Deployment Team

The server deployment team is responsible for planning and designing the server deployment process based on the phases defined for the overall deployment team. The server deployment team is further divided into teams focused on technical planning, Active Directory, logistics, and migration. The strategic goals the server team identifies are:

- Define Windows 2000 Active Directory services that can be used by all operating companies.
- Develop a migration plan from the current Windows NT Server 4.0 environment to a Windows 2000 environment.
- Develop short-term preparation steps.
- Implement a corporate backbone pilot.
- Implement guidelines and Windows 2000 models for all operating companies.

Figure 2.3 illustrates the project management framework the server team is using for deploying Windows 2000.

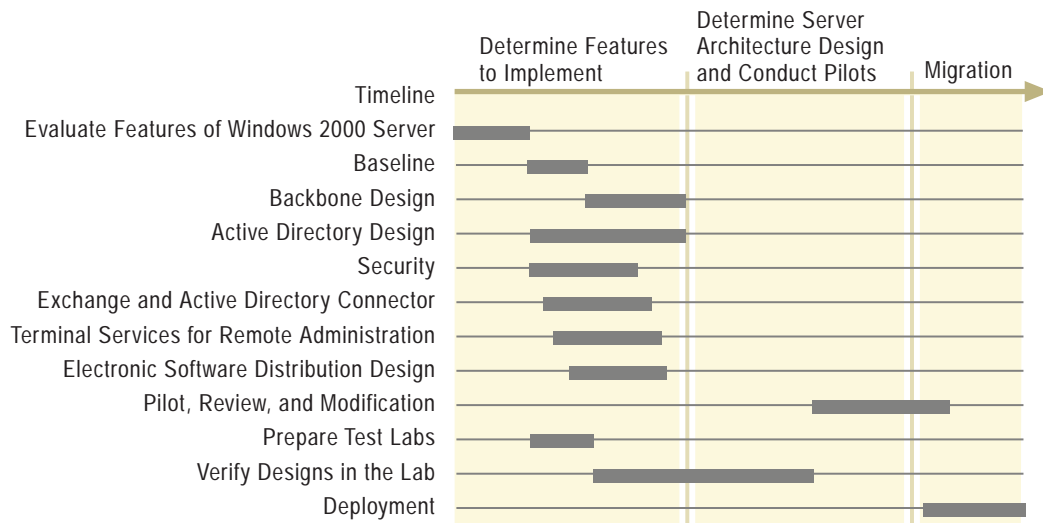


Figure 2.3 Server Deployment Process for a Multinational Manufacturer

Server Phase 1: Determine Features to Implement

The primary goal for the server deployment team is to create deployment standards for a common directory and domain model that all operating companies can use. They also need to establish a global Windows 2000 infrastructure to support all of the operating companies. First, the team focuses its attention on designing an infrastructure backbone using the main corporate IP backbone points of presence worldwide. The backbone is a logical backbone of root namespace and domain controllers, not a physical network backbone. Using the Windows 2000 infrastructure, they need to develop a backbone that all of the operating companies can join. Each operating company needs to interface at the forest root and share a common global catalog.

Then, the team starts to identify specific technologies that the enterprise will require based on business needs. For example, because English is the common language for all system administrators worldwide, MultiLanguage capability at the server level is not required. The specific issues they decide to focus on include:

- Designing domains and sites
- Designing organization units
- Determining use of DNS or WINS name resolution
- Understanding replication and containers of Active Directory
- Synchronizing Exchange directory service with Active Directory
- Designing the Windows 2000 Active Directory
- Developing standards for a common server operating system configuration
- Determining domain controller and Global Catalog placement criteria and where they will be located

Table 2.3 provides a checklist of activities that the company developed to determine when the server team's Phase 1 goals are complete.

Table 2.3 Phase 1 Milestone Completion Checklist

Completed	Item
	<p>Establish pilots of four to six servers in a minimum of three locations.</p> <p>Get approval to use <domainname>.net/<domain>.int for the root domain name.</p> <p>Install Windows 2000 Server in a specified number of corporate IT points of presence.</p> <p>Define the <company.XXX> DNS structure, including:</p> <ul style="list-style-type: none"> Configure integrated DNS dynamic update server for the <company.XXX> domain in European location X. Configure an integrated DNS dynamic update server in US location A. Update the core IT servers with the new domain information. Verify record serialization and zone transfer with the core operating site. Start Direct Host at <company.XXX> on mm/dd/yyyy. <p>Define the core operating configuration, including:</p> <ul style="list-style-type: none"> Establish global catalogs at European locations X and Z. Identify subnets. Create X number of sites. Establish site links between European locations X and Z. <p>Enhance management capability by installing Windows 2000 Terminal Services for remote administration.</p> <p>Enable electronic software distribution by configuring backbone sites to replicate Windows 2000 builds to European location Z.</p> <p>Create the directory service in a pilot scenario by:</p> <ul style="list-style-type: none"> Populating the pilot directory service from the corporate directory data (200,000+ names). Verifying replication and load on the system. Deleting the population after the test.

Server Phase 2: Prepare Final Server Architecture Design and Conduct Pilots

The team is now ready to focus on phase 2 and begin establishing the various operating company domains for the pilot. Some domains are new, while others will be migrated from Windows NT Server 4.0. The specific issues they have decided to focus on include:

- Design the Active Directory structure and validate it in the test lab.
- Develop migration plans for Windows NT Server 4.0 to Windows 2000 Server.
- Develop a standard installation process for server deployment.
- Establish an enterprise integration lab.
- Define specifications for other Windows 2000 features.
- Activate a communications plan to end users, including IT in other operating companies, IT administrators, and desktop users.

Table 2.4 provides a checklist of activities the company developed to determine when the server team's Phase 2 goals are complete.

Table 2.4 Phase 2 Completion Checklist

Completed	Item
	Identify 10 pilot locations, including four in the USA and five in Europe, one of which is the European client lab.
	Deploy 18 to 24 servers in a pilot environment.
	Deploy 30 to 40 workstations in a pilot environment.
	Configure the corporate IP backbone through a virtual private network (VPN) by configuring firewalls for VPN access between operating companies and appropriate corporate backbone locations.
	Define administrative delegation, including: <ul style="list-style-type: none"> Pre-create domains for the operating companies. Delegate operating companies into DNS zones.
	Create a domain for the operating companies, including: <ul style="list-style-type: none"> Installing operating company domains in five European and four US locations. Identifying participating operating company subnets. Creating sites and delegating site management. Creating site links between operating company sites and backbone sites. Establishing a global catalog at every participating site (not operating company).

(continued)

Table 2.4 Phase 2 Completion Checklist (*continued*)

Completed	Item
	<p>Define delegations for each operating company, including:</p> <ul style="list-style-type: none"> Creating an organizational unit structure within the operating company domain. Delegating administration of organizational units. <p>Determine user accounts and create accounts for members of the server and client deployment teams.</p> <p>Attach client computers belonging to the Windows 2000 deployment team to the operating company domains.</p> <p>Establish a Windows NT Server 4.0–style trust as a production resource domain for the operating company.</p> <p>Integrate WINS in the operating company backbone as appropriate.</p> <p>Integrate Microsoft® Exchange Server by configuring the Active Directory Connector at each operating company and providing one-way synchronization to update Active Directory information.</p> <p>Create a certificate authority.</p> <p>Create directory service replication.</p> <p>Deploy Windows 2000 Professional in coordination with the client deployment team through:</p> <ul style="list-style-type: none"> Developing an unattended setup of a client prototype in different domains. Using Group Policy for clients on all domains. Installing MultiLanguage packs on a client prototype with three sample languages. Enabling international client roaming. Installing and using each operating company’s standard software on all sites that are Group Policy object–based. Ensuring that workstations can access Windows 2000–based resources through existing Windows NT 4.0 Remote Access Services. <p>Define users by:</p> <ul style="list-style-type: none"> Using Group Policy for users on all domains. Ensuring that user roaming in different domains is operating correctly (default client language needs to be identical). Ensuring that user roaming internationally is operating correctly (different default client languages). Ensuring that resource access in different worldwide domains is operational.

Server Phase 3: Present Migration Plans to Operating Companies

The focus for phase 3 is on migrating services from Windows NT Server 4.0 to Windows 2000. The services will be migrated following a risk assessment designed to reduce the impact on existing production systems. As the team achieves some success in migrating key components, the level of complexity increases, which in turn increases risk. The deployment team will present the plans to the operating companies for use as prototypes after the team completes thorough testing. The activities during this phase include:

- Present a migration strategy.
- Introduce Windows 2000 concepts and proposed designs to the operating companies.
- Market the proposed design to executive management (IT Review Board).
- Market the project and proposed design to end-users.
- Prepare a disaster recovery plan to ensure business continuum, especially:
 - A backup strategy
 - A rollback (fallback) strategy to Windows NT 4.0 after migration to Windows 2000

Table 2.5 provides a checklist of activities the company developed to determine when the server team's Phase 3 goals are complete.

Table 2.5 Phase 3 Completion Checklist

Completed	Issue
	Determine site migration locations in multiple geographical locations including North America, Europe, and Asia.
	Determine the number of servers to migrate for each domain and each site.
	Determine the number of client computers to be migrated for each domain and each site.
	Conduct WINS migration by incorporating a Windows 2000 WINS server in an existing environment.
	Conduct a DHCP migration by incorporating a Windows DHCP server into an existing environment.
	Conduct a print server migration by selecting a number of print servers that are not Windows NT Server 4.0 domain controllers and upgrade them to Windows 2000.
	Conduct an Internet server migration by implementing a Windows 2000 deployment Web site using IIS 5.0 and creating a pointer from the existing central site. Replicate content from the trial site to the new site. Add DNS records to this server.
	Reduce resource domains by selecting a Windows NT 4.0 resource domain and migrate it to Windows 2000 Server.
	Create new account domains by migrating the Windows NT 4.0 account domain primary domain controller to Windows 2000 Server.

The Client Deployment Team

The greatest challenge for the client deployment team is to work with all of the operating companies to get consensus on one client computer configuration. The existing client operating systems in the organization include Windows 95, Windows 98, and Windows NT 4.0 Workstation. Additional client issues the team considers are:

- Reducing the number of applications in use company-wide. There are currently 1,000 or more applications, making it difficult for the IT team to provide support.
- Changing the IT focus from the traveling computer to the traveling user.
- Studying whether to change from the existing method of deploying software in Windows NT Server 4.0.
- Providing more hardware support for laptop computers.

The team needs to develop a proposal that will help the operating companies decide whether to upgrade their clients or their server infrastructure first. While the team realizes that both options are possible, the members decide that the following issues in favor of upgrading the server infrastructure first are relevant for the organization:

- More centralized control over the client computers.
- Limit users' capability to modify the client computer configuration.
- Use Windows 2000 tools for installation.
- Have a global catalog enabled for all users to access.

The team discovers that most of the operating companies in the organization would like to upgrade their servers first, and then after Active Directory and a global catalog are enabled, implement Group Policy and other change and configuration management tools for more granular client computer administration. They also realize that deciding whether to upgrade the servers first is particularly important if the team plans to recommend the use of Windows 2000 Group Policy for software deployment. The team will need to study how the use of Group Policy will affect Active Directory. This organization has the following goals for the client architecture team:

- Develop a standard client configuration as a modular product for all of the operating companies.
- Create a reference installation including hardware, software, and operations.
- Design a framework for a global model that allows users to log on anywhere in the world.
- Develop a model for training and helpdesk support.

The client team's work is divided into two phases:

- Phase 1: Client standard configuration issues
- Phase 2: Software logistics

Phase 1: Client Standard Configuration Issues

To meet their worldwide business use goals, the client team decides to use a standardized configuration that includes:

- Windows 2000 Professional clients
- Microsoft® Office 97 or Office 2000
- Virus scanning capability
- Web browser
- E-mail client
- MultiLanguage capability
- Windows Terminal Services capability (ensure that client design is suitable for Terminal Services).
- Enabling international client roaming so that users can connect or dial-up to the corporate IP backbone from anywhere in the world and access:
 - Personal settings for desktops and applications.
 - Personal documents and mail available everywhere.
 - Enterprise-wide standard software.

Phase 2: Software Logistics

During phase 2, the team focuses on developing a strategy for getting the new operating system and client configuration to both stationary and mobile clients in a stable and efficient manner. The team identifies the following issues:

- Creating installation packages for:
 - Enterprise applications.
 - Common applications for all operating companies.
 - Custom applications for each operating company (as necessary).

- Creating a guide for installation packages to include:
 - Standardized package development worldwide for all operating companies.
 - Unique installation package per application worldwide for nonstandard software.
- Application repackaging as necessary for each operating company.
- Assigning installation packages:
 - For all users.
 - For user groups by function or organization.
 - For client specific needs.
- Installing applications based on user demand

The client deployment team has found that management wants to continue the practice of installing new client operating systems and configuration images in conjunction with buying new hardware. The average operating system deployment in this organization takes three years. Internal TCO studies determine that spending more money up front on better hardware and then upgrading the new client configuration image prior to installing the new hardware on users' systems reduces TCO. Additionally, significant client benefits for system administrators and IT professionals are based on new features and enhanced functionality; whereas, users and executives need to see tangible evidence that productivity is enhanced. Therefore, buy-in by both executive decision-makers and end-users is required before the project can move to the deployment phase in each operating company.

Technology Dependencies

Because Windows 2000 Server is a multipurpose network operating system that is designed with distinct—but integrated—features that can be deployed incrementally, there are numerous technology dependencies that you must consider as you plan your deployment. The following examples illustrate some of these technology dependencies.

Active Directory and Domain Namespace

Your Active Directory structure and Domain Name System (DNS), along with your infrastructure plans for Windows Internet Name Service (WINS), Dynamic Host Configuration Protocol (DHCP), network protocols, files, printing, streaming media, and other bandwidth-intensive applications, must be designed to accommodate business requirements and IT capabilities. If your business needs dictate numerous subsidiaries, and roaming or remote access users, then you need to consider organizational units, Group Policy, security, and IntelliMirror technologies. If you want to offer secure intranet or extranet capabilities, then IP Security (IPSec), and PKI are important components to design.

If you will deploy Windows 2000 Professional as your primary operating system for desktops and laptops, then you might want to consider installation options, MultiLanguage capabilities, security, Active Directory, and other change and configuration management technologies. Finally, if you are in a heterogeneous environment that includes network operating systems other than Windows NT or Windows 2000, you will need to consider interoperability and coexistence options.

Active Directory and Exchange Server

You might be planning to deploy Active Directory in a geographically dispersed environment where centralized IT management is difficult because of low-speed WAN links, and there is great potential for compromising a stable and secure connection. Yet, you also might have a business requirement for a stable, secure, and common e-mail and collaboration system across different operating companies, including geographically remote sites. You need to consider the relationships between Active Directory and Exchange Server 5.5 directory service, with Group Policy, IPSec, and virtual private networks (VPNs). Plan to use the Active Directory Connector (ADC) to keep your data synchronized with your Exchange directory. You must also consider DNS design, especially if you have multiple organizations, subsidiary operating units each with its own Internet domain name, domain and tree structures, security requirements, and different network operating system or IT standards. DNS design is especially important if groups other than the Windows 2000 team are responsible for the DNS namespace, as with many UNIX-centric IT organizations.

Integrating Exchange Server

If you require a common e-mail standard and a common directory, but your organization does not use Exchange Server 5.5, then you might need to implement Exchange Server 5.5 prior to deploying Windows 2000 so you can synchronize with Active Directory using ADC. Alternately, you could scale back this goal until you have completed your Windows 2000 deployment and then deploy the next version of Exchange.

Remote OS Installation

Another example might take place in a user location with limited support but excellent connectivity where local client installation was maintained manually in the past. Using Remote OS Installation and IntelliMirror technologies, you now have an opportunity for remote installation and troubleshooting without needing on-site support.

You will find more information on technology dependencies in each of the technical planning chapters in this book. Remember, each feature that you want to deploy needs to have its own design so that it can be formally tested in both lab and pilot environments.

Tips for Planning Your Windows 2000 Deployment

Your ultimate goal when creating planning documents and formulating a deployment plan is to successfully deploy Windows 2000 using project management techniques that work in your organization. The following sections provide lists of items to consider as you plan your deployment.

General Best Practices

The following list contains overall best practices as identified by some early adopters of Windows 2000.

- Use your organizational chart and see how the management structure in your organization matches up against both your organizational needs and your network LAN links. Build an Active Directory infrastructure based on these considerations.
- Determine what level of international functionality you want to achieve and what trade-offs you are willing to make to get there.
- Schedule for an additional level of complexity in testing your product.
- Plan your application setup around Windows Installer.
- Decide how you will break down system administration responsibilities for your application and identify who will be given administrative permissions.
- Determine what policies are enforced on a typical user's system.

- Utilize the new components provided by Windows 2000. Integrate them wisely to minimize their impact on the performance of your application.
- Schedule enough time for installing Windows 2000 server—a several-hour process.
- Add international issues to your Windows 2000 issue lists and test tracking systems.
- Develop “working groups” to study task-based architecture decisions.
- Write a good test plan and set up a test lab that exactly mirrors your production environment in terms of types of hardware and software in use.
- Upgrade conservatively at first. You can speed up the process and rate of deployment as you start achieving success.

Deployment Phases

Determine the best overall order to deploy Windows 2000 in your organizations. The following order was used by one company:

- Define your current environment by determining which server and client operating systems are currently in use in your organization. Study their functionality and the purposes they serve.
- Study whether the number of users is likely to change due to mergers, acquisitions, reorganizations, or growth.
- Study the need to scale your server environment (determine your needs for clustering and load balancing as well as Terminal Services).
- Design your Active Directory structure including your DNS namespace.
- Upgrade your network infrastructure and member servers.
- Implement Active Directory and storage management.
- Upgrade or migrate your clients to Windows 2000 Professional.
- Implement desktop management using change and configuration management tools.

Application Installation Issues

Use the following planning tips as you plan for installing applications in your organizations.

- Make an early investment in setup authoring. Take the time to lay out your setup process early in the product development cycle.
- Involve developers in the setup authoring process. This will help uncover dependencies early on.
- Be aware that Windows Installer validations can affect your application's performance.
- Avoid reboots during install wherever possible.
- Do not add to Win.ini, System.ini, Autoexec.bat, or Config.sys.
- Require everyone testing your applications to install them using the Windows Installer.
- Keep in mind that an administrator can advertise your product on the user's Start menu or desktop without fully installing the product. The application will be installed when the user double-clicks on a shortcut or on a document of the type served by your application.
- Understand and plan for "system file protection" issues.

International Issues

The following tips will help you plan for an international installation.

- Avoid assumptions about the language version of the operating system that your application is running.
- Avoid assuming that the locale, code page, and user interface match for a given user or computer.
- Use Windows Installer. It is available in both ANSI and Unicode.
- Determine what fonts are needed. Often all that is needed to support international functionality are the correct fonts.
- Use the latest Windows 2000 printer drivers. They will provide the best support for international features.
- Check both your application and the operating system when tracking down international problems.

Performance Issues

Maintaining high performance is important to meeting the goals of most deployments.

The following tips will help you plan for improved performance.

- Delay any startup initialization that you can.
- Simplify startup screens so that fewer graphic bits are being sent across the network.

- Plan for network interruptions and general network performance issues.
- Use the caching layer that Windows 2000 provides for its file systems when a share goes offline.

Roaming Users and Terminal Services

The following tips will help you plan for roaming users and for Terminal Services installations.

- If you plan your roaming user scenario carefully, a substantial part of your Terminal Services implementation will be done as well.
- Support roaming user profiles and state separation.
- Separate per-user settings from per-computer settings.
- Do not require write access to the per-computer settings.
- Keep in mind that regular Windows 2000 users have the ability to modify data only in their user profiles. Your application will not be able to change portions of the HKEY_LOCAL_MACHINE subtree in the registry.
- Run your application while logged on as a user (rather than as an administrator) and test it on computers where users do not have administrative privileges. This will let you catch problems early.

Administration

As you create your plan, use the following administration tips to make it easier for you to administer your Windows 2000 installation.

- Make sure that the administrative features of your application are as simple as possible while still providing full functionality. This will help deployment of the application in small or medium-sized organizations where custom tools are not developed.
- Support scripting in your application. One strategy: If you write a provider for Windows Management Instrumentation (WMI), it will allow you to provide simple scripting support in your application inexpensively.
- Support OnNow/ACPI requirements. Handle sleep and wake notifications and requests.
- Keep in mind that default security settings are substantially more secure for regular users than they were under Windows NT 4.0—what worked under Windows NT 4.0 for regular users might require them to be power users with Windows 2000.

Planning Task List

Table 2.6 summarizes the tasks you need to perform when creating your Windows 2000 deployment roadmap.

Table 2.6 Deployment Roadmap Task List

Task	Location in Chapter
Define a project management process that identifies key milestones and deliverables appropriate to your organization.	Preparing Your Project Planning Process
As you identify specific features you want to deploy, study their technological dependencies on other Windows 2000 features and technologies.	Feature Design and Development
Identify any project management constraints that can affect deployment. For example, financial or human resource constraints, or organizational logistics such as holiday season fulfillment or year-end finance issues.	Determining Goals and Objectives
Develop a process for risk assessment and prepare a thorough risk analysis.	Determining Goals and Objectives
Define the order in which you will stage your deployment.	Deployment Scenarios
Create a project plan for your organization focused on Windows 2000 features, deployment teams, schedules, and associated dependencies.	Deployment Scenarios

For more information about project management, see the Microsoft Solutions Framework link on the Web Resources page at <http://windows.microsoft.com/windows2000/reskit/webresources>.