

# Pro SMS 2003



Rod Kruetzfeld

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# Planning Your SMS 2003 Implementation

**S**uccessfully implementing SMS 2003 requires careful planning and making several up-front design decisions. Before proceeding with your installation, you need to consider some important issues, make several design choices, and be able to answer a few key questions. Otherwise, you may be left mid-operation wanting to roll back your implementation.

This chapter will help you answer the following questions:

- Should I perform an upgrade or new installation?
- How will I know if my design will handle the intended client load?
- What server hardware do I need?
- What Active Directory issues do I need to consider?
- How will my network handle the load?
- How should SQL Server be configured to work with SMS 2003?
- Which method should I use for SMS client discovery?
- What do I need to consider for multiple-site configuration?
- How will I configure my SMS site boundaries and client roaming?

## Upgrade or New Installation?

One of the first questions you will be facing is whether to perform an upgrade or new installation of SMS 2003. Each method has its advantages and disadvantages.

By performing an upgrade of your existing SMS infrastructure, you can easily transfer the entire site configuration to your new SMS 2003 site, retain and migrate the SMS clients at your leisure, and preserve your existing SMS database contents. However, with an upgrade, you may need to contend with SMS configuration issues that currently exist, SMS 2.0 clients that may not be responding, and potential database corruption issues that may be carried forward. You may mitigate those issues to some degree by being proactive in your management of your site, ensuring your SMS clients are healthy and responding correctly, verifying your SMS site configuration, ensuring you understand what settings you have and why, and performing database consistency checks on your existing SMS database.

Typically, in practice, I have seen poorly implemented SMS 2.0 sites that are abandoned in favor of starting fresh with SMS 2003. Generally, this is a good idea.

When performing an SMS 2003 upgrade, you typically start at the top level of your SMS hierarchy. If you have just a single site, this is easy. Multiple sites that have child sites are significantly more complex, but can be handled with the same approach. When you have a larger-sized SMS hierarchy, your design considerations are more likely to change when moving to SMS 2003 due to the software's architectural changes.

Before upgrading, you must first execute the Deployment Readiness Wizard on every site that you will be upgrading to SMS 2003. This wizard will assist in preparing your site for the upgrade process by checking for common errors and reporting them.

If you have older clients that are not eligible to be upgraded to SMS Advanced Clients, you may want to consider a holding site as an option. A *holding site* is an SMS 2.0 site that will allow you to maintain older Windows clients until they are able to be upgraded to a Windows platform that will support the SMS 2003 client.

If you choose to perform an upgrade and you have new hardware for your SMS site, you may be able to do a side-by-side upgrade. If you don't have new hardware, you will need to perform an in-place upgrade. Let's look at both types of upgrades, and then review the documentation you should maintain for SMS installation.

## Side-by-Side Upgrade

You may have new hardware available for your use in the new SMS 2003 site. An easy way to incorporate this into your upgrade process is by performing a side-by-side upgrade.

The basic concept of this type of upgrade is that you will retain your existing SMS site, and build a new SMS 2003 site and assign it as a parent to the existing SMS 2.0 site. By adding it as a parent site, you can transfer clients and SMS database information to the new site.

Note that you need to take a couple of precautions with this approach:

- You will be assuming some additional complexity in handling two SMS sites. Any existing help desk or other staff members who are accessing clients via the SMS console will need to be aware of this change and locate clients accordingly at the new site.
- When the connection is made between the two sites, the existing SMS site will be compelled to transfer its database contents upward to the parent primary SMS 2003 site you created. You may want to be sure that you create some restrictions on the senders (network links) when connecting to the new SMS 2003 site from the older SMS site, and/or perform this operation during off-peak hours. Needless to say, don't do this to two sites across a small or saturated WAN link during peak business hours.

Once the connection is made and you are able to access clients from the new SMS 2003 site, you can swing the site boundaries over to your new SMS 2003 site, effectively moving the clients from the old site to the new SMS 2003 site. At this point, you may start your SMS client upgrades from the Legacy Client to the new Advanced Client. I will discuss Advanced Client deployment options in Chapter 3.

Once your clients have been moved to your new SMS 2003 site, and your database has pushed its data to the SMS 2003 database, you may decommission the old SMS site. Note that you need to do this correctly—it is not as simple as just turning off the old site. Chapter 3 covers removing SMS 2003 sites.

## In-Place Upgrade

If you do not have new hardware available, your options are significantly more limited. If you deem your existing hardware capable of operating the new SMS 2003 site, you may perform an in-place upgrade on it. By simply upgrading your existing SMS site to SMS 2003, you can preserve all settings and database contents.

This is a simple yet effective method. Unfortunately, it poses restrictions on incorporating new hardware for your SMS 2003 site. There is also a point of no return when you perform this type of upgrade. During the upgrade, significant portions of the SMS site code are altered or deleted, so it is difficult to roll back to the previous state gracefully. If you cancel the upgrade, your existing SMS site may be left in an unusable and unrecoverable state.

If you have made any unique configurations, like customizing the `SMS_def.mof` file, you should preserve a copy of the affected files before performing the upgrade, as they will be replaced during that cycle.

Also be aware that site settings such as status message rules, agent settings, tasks, and so on do not transfer their settings across to your new site, so you will need to make those alterations yourself. It may be a good time to examine some of those settings to make sure they make sense in your new environment.

As always, perform adequate backup operations before proceeding with any type of upgrade or major change activity.

## Installation Documentation

A commonly overlooked area is the documentation of the installation process, including the settings that you may have configured. I recommend performing the operations in a lab environment that resembles your production model to the extent possible. By performing these actions in the lab first, you are able to validate your installation or upgrade process, ensuring it is producing the results you intended. While you are performing this mock installation or upgrade process, you can document the steps you are taking to get to your desired state.

I am a big fan of screenshots. I snap screenshots and paste them into WordPad. It may seem pretty basic, but it gives you an idea of what was set and how it looked at each step. Other staff can also understand these types of documents.

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**Tip** Several commercial tools make it easy to capture screenshots. One of my favorites is Screenshot Captor (<http://www.donationcoder.com/Software/Mouser/screenshotcaptor/index.html>). This product is free to use and has plenty of useful features, yet comes in a lightweight package.

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Pretty screenshots are not enough, though. You need to document which domain accounts are used, passwords, and relevant settings information. In a text document, I note any settings that I've changed from the default, if for no other reason than the document may be easier to read than a screenshot; for example, it's easier to tell that *O* from a *0*.

I recommend creating a few different documents when performing an installation or upgrade. First, a design document will show you how the site should be laid out when you are finished. Document all the sites that are going to be affected, their network link details, and the numbers and types of clients at each site. Create a capacity planning document to document the planned capacity usage of various resources. You will need to include some base assumptions: hardware and software inventory intervals and details, frequency and size of software distributions, and other variables. When starting from scratch with a new installation, it is difficult to tell if you will need to vary from the default values for these options, plus changing them will affect your overall design considerations. For example, a higher frequency of inventory cycles has the potential to increase storage requirements, CPU requirements on the server, network traffic quantities, and client system CPU usage.

## Capacity Planning

Microsoft has been kind enough to create a tool, called the SMS 2003 Capacity Planner, that will assist you in designing and sizing your SMS 2003 site hierarchy. This tool is useful not only for large, complex environments, but also for simple single-site implementations. It produces traffic-consumption calculations based on many configurable variables. You can download the SMS 2003 Capacity Planner (did I mention it's free?) from <http://www.microsoft.com/downloads/details.aspx?familyid=009e0c30-bded-4b95-a8f9-06037de85c57&displaylang=en>.

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**Note** The SMS 2003 Capacity Planner is written as a Microsoft Excel Workbook. You will need to enable macros to allow the tool to function correctly.

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The operation of the Capacity Planner can be broken down into four basic steps. Each of these represents a unique phase in the planning and layout of your SMS site and the operational assumptions:

*Topology:* In the first step, you will break down your physical network layout and insert it into the worksheet. You input the number of clients and also the appropriate WAN/LAN information for the associated location. Each line will represent a separate location.

*Assumptions:* In the second step, you check the assumptions that have been predefined by the Capacity Planner. Various features of SMS are represented here, with sizes and frequencies of these functions. Unless you know that you will be increasing the frequency of inventory cycles or performing larger software distributions, you may want to leave most of these values at their default settings.

*Analysis:* In the third step, an Excel worksheet analyzes the topology and assumptions made in the model. After initiating this analysis process, you will be presented with a dialog box asking you to choose a configuration to represent the edge system, or SMS component, at this location. The edge system may range from none all the way up to a full SMS primary server. You will need to perform this operation for each location.

*Output:* In the last step, the Capacity Planner will present you with the output of an analysis for your unique topology. It will present hardware suggestions and give you an estimate of the hardware configuration you may require to operate the given site topology. Since hardware performance is always evolving, I suggest using the suggestions and estimate as minimum standards.

Before getting started with the Capacity Planner, consider using the preplanning worksheet from the Scenarios and Procedures for Systems Management Server 2003: Planning and Deployment document (available as a Microsoft download from <http://www.microsoft.com/downloads/thankyou.aspx?familyId=E0644BB4-2336-4254-8A18-9BC180713F7E&displayLang=en&Ref=http%3a%2f%2fwww.microsoft.com%2fsmserver%2ftechinfo%2fproductdoc%2fdefault.msp>). This Excel worksheet helps you identify your physical sites and key configuration parameters for each. Once you've completed the preplanning worksheet, it's fairly easy to transfer the data into the Capacity Planner.

The following sections describe the Capacity Planner steps in more detail. I will assume that you have gone through the discovery steps of completing the preplanning worksheet, or at least have created a table of similar data about your organization.

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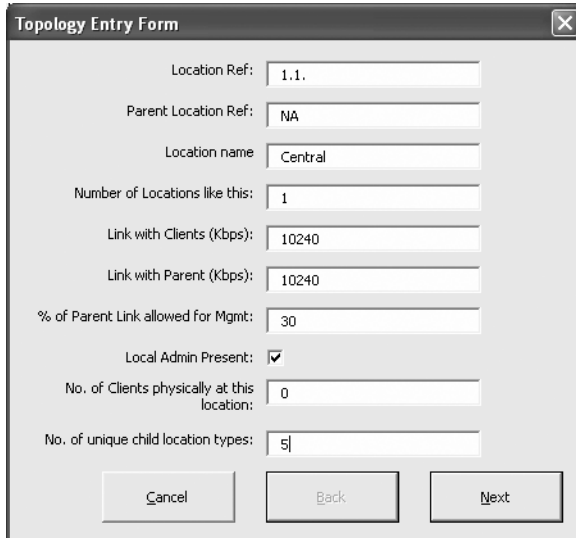
**Note** The Capacity Planner comes with a nice user guide that you should read to fully understand its operation.

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## Topology

Start the topology build process by clicking the Build Topology button in the Scenario Analysis worksheet of the Capacity Planner. You will be presented with a Topology Entry Form dialog box.

When defining your physical layout, you should start at the center of your organization. This will be considered your central site and also your top tier. Figure 2-1 shows an example of a completed Topology Entry Form for a central site. Any site that connects directly to this site will be considered a tier below, or second tier.



The screenshot shows a dialog box titled "Topology Entry Form" with a close button (X) in the top right corner. The form contains several input fields and a checkbox, all with values entered. At the bottom are three buttons: "Cancel", "Back", and "Next".

Field Label	Value
Location Ref:	1.1.
Parent Location Ref:	NA
Location name	Central
Number of Locations like this:	1
Link with Clients (Kbps):	10240
Link with Parent (Kbps):	10240
% of Parent Link allowed for Mgmt:	30
Local Admin Present:	<input checked="" type="checkbox"/>
No. of Clients physically at this location:	0
No. of unique child location types:	5

**Figure 2-1.** *Topology Entry Form for a central SMS site*

The key to successfully re-creating a topology is to preplan it for your site locations. This enables you to enter a valid value for the number of unique child location types. For example, in Figure 2-1, I've specified five unique child sites. This value gives the Capacity Planner an indication of how many sites you will be defining, and when to end the Topology Entry Form.

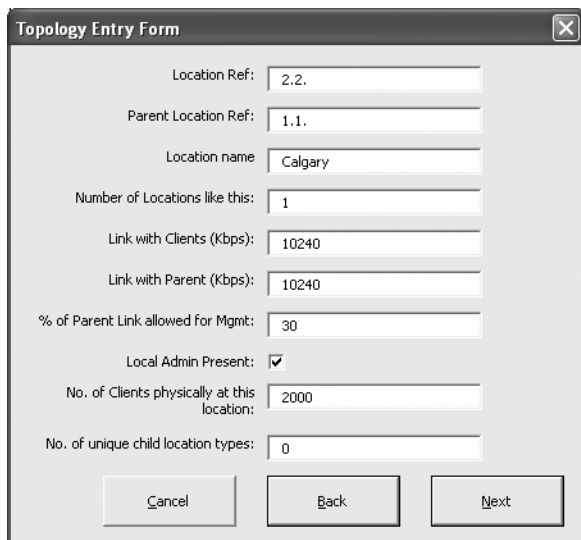
You continue defining other locations and their configuration data. Each location that you define should represent a physical location in your organization. Each location is typically connected by network links and contains some number of clients. Figure 2-2 shows the last Topology Entry Form for the topology with five child sites I started in Figure 2-1.

In some cases, large organizations may have thousands of locations to enter. In this case, the task of entering data manually would be overwhelming. To avoid this, you can assume generalized parameters about groups of locations, such as the network link size and number of clients to be serviced. By making these assumptions, you can create multiple sites by specifying the number of locations like this in the given tier level.

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**Note** You will likely not go further than third or fourth tiers in most large organizations, as SMS architecture is optimized for a flatter architecture. For more information on this topic, review the Systems Management Server Concepts, Planning, and Deployment Guide, available as a download from Microsoft (<http://www.microsoft.com/downloads/details.aspx?familyid=784838B3-34E0-4122-B3E2-17C5B4EEF8F4&displaylang=en>).

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The screenshot shows a 'Topology Entry Form' window with the following fields and values:

Field Label	Value
Location Ref:	2.2.
Parent Location Ref:	1.1.
Location name	Calgary
Number of Locations like this:	1
Link with Clients (Kbps):	10240
Link with Parent (Kbps):	10240
% of Parent Link allowed for Mgmt:	30
Local Admin Present:	<input checked="" type="checkbox"/>
No. of Clients physically at this location:	2000
No. of unique child location types:	0

At the bottom of the form are three buttons: 'Cancel', 'Back', and 'Next'.

**Figure 2-2.** *Topology Entry Form for the final site*

An alternate strategy you may consider is to group your clients logically by service rather than by physical location. You still need to enter network link information, but the result will be an alternative logical SMS site configuration that may better serve your unique needs.

After entering the values, you can go back and alter these values in the Capacity Planner to perform some what-if or growth scenarios.

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**Tip** When I perform the topology step, I tend to do it in two phases: first to represent the existing WAN/LAN configuration and client numbers, then a second time in another sheet to represent aggressive growth for three years in the future. This gives me a better idea of what the existing capacity is and allows me to project growth.

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The Topology Entry Form has several fields. Some of the field labels are somewhat cryptic at first glance. Here's a brief description of each field:

*Location Ref:* An internally generated value that is used to keep track of your topology configuration. Don't change this value.

*Parent Location Ref:* Like the Location Ref field, an internally generated value that you shouldn't change.

*Location name:* A name for the physical or logical location you are defining. You can use any naming convention that makes sense in your environment.

*Number of Locations like this:* If you have multiple locations in this tier that match this configuration, enter the number of them here. If there is only one location like this in the current tier, enter 1.



*Link with Clients (Kbps):* The speed of the LAN connection between clients and their potential site server. Typically, the value used here will be 10Mbps or 100Mbps (1024Kbps or 10240Kbps). If this represents a virtual private network (VPN) location or grouping, enter the estimated speed of the VPN link, using the lowest potential speed (56Kbps is likely).

*Link with Parent (Kbps):* The speed of the link with the parent location, or WAN link speed. Again, these values are in Kbps. This value will be used with the calculation in the next field to calculate the available network bandwidth between SMS site locations within the topology.

*% of Parent Link allowed for Mgmt:* Typically, the amount of bandwidth that is acceptable for SMS to use. You may think of it in two ways: either the WAN utilization that SMS is permitted or the amount of bandwidth available for SMS to use, calculated as the available bandwidth (with any line-of-business traffic subtracted).

*Local Admin Present:* If you have IT staff at the location who may help maintain the potential SMS site, enter Yes in this field; otherwise, enter No. If you do not have IT staff resources at this location, you should consider not having a primary site located there, as all maintenance will need to be provided remotely.

*No. of Clients physically at this location:* The number of SMS 2003 Advanced Clients that will be located in that physical or logical location. If you are defining a central site to be used strictly for management, enter a value of zero (0).

*No. of unique child location configurations:* The number of sites you are considering. The Capacity Planner will require a Topology Entry Form to be filled out for each child location specified here. In the example in Figure 2-1, I entered a value of 5, for five unique sites to define and later analyze.

After you fill in the last Topology Entry Form, you will be presented with an Excel worksheet with all the site configuration information compiled. You can make changes at this point. It is prudent to save a copy of the worksheet before making any further changes.

## SMS Site Assumptions

The Capacity Planner makes some assumptions about how you will use your SMS hierarchy. These base assumptions are a good starting point, but you can tailor them to suit your unique requirements.

Click the Assumptions button to go to the Assumptions worksheet. You may toggle on and off features of SMS 2003. The assumptions are divided into two sections: basic and advanced. By default, the tool assumes Inventory, Software Metering, and Software Distribution are enabled in your environment. You may alter the size of your large application deployments and their frequency to suit your environment. One aspect that is not reflected in here is how to use the SMS Operating System Deployment Feature Pack. I tend to adjust the large application size upward to compensate for this.

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**Note** If you feel that the use of the SMS Operating System Deployment Feature Pack is an important calculation, or would like to see any other feature enhancement, drop a note to [SMSWish@Microsoft.com](mailto:SMSWish@Microsoft.com).

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Let's look at few basic assumptions that are being made about the site and why you may want to alter their values.

*Roaming Clients Percentage:* Make sure that this value is truly reflective of your client environment, as roaming clients pose a significant impact on an incorrectly configured SMS hierarchy. (Roaming clients are discussed in the “SMS Advanced Client Roaming” section later in this chapter.) The default value is 10%. Your value may be significantly different.

*Policy Distribution Cycle:* Be sure to adjust this value to suit your intended environment. The default is 60 minutes. If you use a higher value, it will increase the client’s network traffic and load on your Management Points (MPs). Adjust the percentage of the Clients Going Through Re-imaging/Redeployment setting to a value that suits your environment. If your environment experiences frequent rebuilds of desktop clients, those systems will be requesting policies and advertisements at a higher rate. Also consider the impact SMS Operating System Deployment Feature Pack imaging activities may have.

*Inventory:* I typically leave the Inventory values alone, other than the Software Inventory File Collection values. If you are implementing the Microsoft Application Compatibility Toolkit 4.01, you should configure these values to reflect the fact that it uses file collection to perform its activities. If you have any other plans for file collection, be sure they are reflected here.

*Software Metering:* I suggest leaving this value alone. How the default was calculated is not well documented. Adjusting it may cause unexpected results.

## Site Analysis

Clicking the Analysis button will take you to the analysis process. This task involves assigning site server roles to each location you defined earlier. (Server roles are described in Chapter 1.) You have multiple options, with representative bandwidth consumption details for each. In some instances, particular roles may not be suitable or available (such as a primary site where there is no IT staff to maintain it).

If you click the Details link for a particular role, the calculated traffic summary is displayed, along with a breakdown of what type of traffic is being generated with the role selected for that location. By examining these values, you may find a different role may be more suitable for the given location. For example, an effective method to reduce software distribution traffic over a WAN link is to assign a Distribution Point (DP) role to that location. Not having a DP may result in a parent link usage of more than 18%. By adding a DP role to that location, you can reduce the parent link traffic to 0.94%. That’s a huge change, achieved just by dedicating a DP to that location.

You may analyze all sites consecutively by clicking the Analyze All Locations button. To reanalyze a single site, click the Analyze a Single Location button.

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**Note** You cannot perform analysis against an edge system, such as a top-tier central primary site.

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## Output

The Output section of the Capacity Planner provides some basic insight into the level and configuration of the hardware required for your SMS 2003 hierarchy. This is pretty basic information, but it should give you some minimum requirements and confirmation that your specific hardware will be enough to support the intended client load and configuration. Here are a few key items you need to consider:

*RAM:* Make sure that the amount is enough for SQL Server to run comfortably along with the host OS and IIS. (RAM requirements for SQL Server are discussed in the “SQL Server Considerations” section later in this chapter.)

*Disks:* Make sure that the disks are properly configured for use with SQL Server and for software package storage. (Disk requirements are covered in the next section.)

*Network card:* Make sure that enough bandwidth is available to support client requests for software packages and policies.

*Backup media:* Make sure that you have an appropriate mechanism in place to support the disk volumes that require backup. Depending on your environment, the backup requirements can be fairly large. OS images alone can consume considerable space, plus you need space for the existing SQL Server database and other software package requirements. Be sure to allow for future expansion and growth.

## Server Hardware

Before you proceed to order your server hardware based on the results of the SMS 2003 Capacity Planner, you should carefully consider what you are buying. As always, try to stay with your normal buying practices for hardware. Try to buy into the same model line as other servers that you support in your environment, staying within the sizing confines as outlined by the Capacity Planner. Key components of the server design are the physical disk array and partitioning layout. Memory and network connections are also important.

### Drive Array Distribution

By correctly configuring disks for use in your SMS server, you can optimize performance of SQL Server and SMS. Keep your OS on a separate logical drive; you may share this disk with other logical drives.

When configuring drive arrays, be sure to account for an internal drive array and an external drive array. You have limited physical space within your internal array, so be sure to design your disk sizes accordingly. If I am designing a server for a mid-sized to large SMS site, I typically use the following design (assuming a six-disk internal array):

- The first two disks are set up as a mirrored pair called array A containing the OS (C), and SMS/SQL Server application (D) installation volumes.
- The remaining four drives are set up as a RAID 5 array B and will have several logical drives containing the backup OS (E), utilities (F), and SMS's SQL database (G).

This configuration allows for growth of SMS's SQL database, plus it has the benefit of four spindles in rotation for fast random disk access to the SMS database files.

Since this example is for a larger installation, I would use an external cabinet to house additional drives. The external cabinet would be physically set up as follows:

- The first two disks as a mirrored pair, array B, containing the SQL database transaction logs
- The remaining five drives as a RAID 5 set with a single logical drive, array C, containing the desktop OS images and SMS packages

Of course, the size of the disks used and the exact parameters of the logical drive created depend on your specific needs and anticipated growth pattern. Be sure to size array C appropriately to allow for multiple OS images, along with a large selection of software packages.

## Server Memory Configuration

You should be sure to size the server's memory configuration appropriately for the size of the SQL database that you expect to be using. Add an allowance for growth and some spare space. With the low cost of RAM, typically 2GB to 3GB is more than sufficient for most applications.

A switch that you can use with systems that contain large amounts of RAM is `/3GB`. This switch changes the way that 4GB of virtual address space is split up. Normally, that address space is split into 2GB available as user mode virtual address space and 2GB available as kernel mode virtual mode address space. The `/3G` switch changes this allocation to 3GB to the user space and 1GB to the kernel space. If your system contains 4GB or more of RAM, I recommend using this switch, as it will increase the amount of user mode address space available.

Normally, reducing the amount of space available to the kernel can seriously affect disk caching and the ability of various components to allocate memory, likely reducing the number of asynchronous I/O operations that can be pending. However, for the Microsoft Exchange Information Store service and SQL Server, making this change can be worthwhile because these applications do a lot of their own disk buffering and unbuffered I/O to their transaction logs (for example, Microsoft Exchange Server's Store service writes the entire content of every message to the transaction log before storing it in the appropriate database).

You can set the `/3GB` switch by editing the `Boot.ini` file and adding the `/3GB` switch to the end of the line:

```
Multi(0)disk(0)rdisk(0)partition(1)\WINDOWS=.../3GB
```

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**Note** For more information about configuring SQL Server and Windows Server for use with large memory configurations, see the Microsoft TechNet article "How to configure SQL Server to use more than 2GB of physical memory" at <http://support.microsoft.com/default.aspx?scid=kb;en-us;274750&sd=tech#kb1>.

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## Network Connections

Since your SMS site server is likely to be talking to a wide variety and number of clients, it makes sense to place it where it is well connected to the bulk of your clients. Try to ensure its network connections are at a core switch or router.

You may decide that network load balancing, rather than failover, is good strategy to follow for your server's network links. As a minimum requirement, be sure to have two 100MB links available for your SMS site server. Gigabit network media are even more optimal, as many large data transfers between your SMS site server and clients may be in progress at any time.

You may mitigate some of this loading effect by distributing the SMS site server roles to other servers in your organization. Be aware of the anticipated load on both the server and its network connections when doing so. Commonly, several DPs are configured for mid-sized environments. This is a convenient way of offloading some network traffic from your SMS site server and provides resiliency of key SMS services to your clients.

## Active Directory Considerations

One of the significant changes with SMS 2003 is its close tie to Microsoft's Active Directory services. SMS is able to leverage Active Directory's security, infrastructure, configuration, and publishing properties. But this also means that your Active Directory services must be in a good state of health before you proceed with an SMS 2003 implementation.

Active Directory sites differ from SMS sites. An Active Directory site is essentially an area of a well-connected network, defined by subnet(s). There may be a single Active Directory site in a simple organization or multiple Active Directory sites in a more complex environment.

SMS 2003 uses your Active Directory site names or subnets to determine its SMS site boundaries. Optimally, Active Directory site names are used because they will reduce administrative overhead in maintaining the Active Directory site/subnet/SMS site relationship. Clients are assigned to SMS sites based on their IP subnet or Active Directory site name. SMS 2003 will determine if a client is assigned to its site based on the client's IP subnet and/or Active Directory site membership.

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**Note** Often, I see Active Directory sites still named with their default name and obviously set up with no thought given to design and implementation requirements. These default sites typically don't have replication set up correctly and may be experiencing degraded performance. If there is any doubt about the soundness of your Active Directory architecture, you are well advised to seek professional services to perform an evaluation.

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Before proceeding with the installation of your SMS 2003 hierarchy in your production environment, you should ensure your Active Directory services are in optimal condition. You may not be experiencing any apparent issues, but a health check may show some configurations that should be altered to optimize the performance of your Active Directory service.

## Active Directory Health Check

Microsoft provides some key tools that you can use to check the health of your Active Directory services: DCDiag, NetDiag, and ReplMon. These are available as free downloads from the Windows 2000 and 2003 Support Tools. Be sure to download the appropriate version for your Active Directory installation. For Windows 2000, get the tools from <http://support.microsoft.com/kb/265706/EN-US>. For Windows 2003, download the entire Windows 2003 SP1 Support Tools from <http://www.microsoft.com/downloads/details.aspx?familyid=6EC50B78-8BE1-4E81-B3BE-4E7AC4F0912D&displaylang=en>.

DCDiag is a command-line tool that checks the state of your domain controllers. Table 2-1 lists some of the more commonly used DCDiag command-line switches.

**Table 2-1.** *Some DCDiag Command-Line Switches*

Switch	Description
/?	Displays additional help and command-line options.
/v	Produces verbose test results.
/q	Shows only errors resulting from the test. This may be useful if you use this tool as part of a scripted health check.
/s: <i>servername</i>	Allows you to specify a specific domain controller to test against.
/fix	Fixes server principal name (SPN) issues.
/f: <i>logfile.txt</i>	Similar to the fix option, but outputs the results to a file. Again, you may use this in a scripted health check.
/test: <i>testname</i>	Restricts the tests to the specified and mandatory required tests.

NetDiag, another command-line tool, gives you invaluable insight into the world of your network connectivity issues. Use it to ensure connectivity between servers, check VPN tunnels, and look for Domain Name Service (DNS) server connectivity issues. Table 2-2 lists some of the more commonly used NetDiag switches.

**Table 2-2.** *Some NetDiag Command-Line Switches*

Switch	Description
/?	Displays additional help and command-line options.
/v	Displays verbose results for the tests being run with details on the network cards and their bindings.
/Debug	Displays an even more verbose output than that produced by the /v switch.
/q	Displays a much smaller return of results while showing issues that were detected. You may want to use this switch after you are overwhelmed by the large amount of results from the /v and /Debug switches.
/test: <i>testname</i>	Restricts the tests to the mandatory tests.

Although Windows 2003 Active Directory has changed slightly from Windows 2000 in the areas of latency and replication performance, the principles of replication have been maintained. Using ReplMon, you can check the replication health for your Active Directory services, and you may be able to identify and resolve issues surrounding replication. You can force replication and observe the results, optimize replication links, and find trust relationship issues between domains or forests. Unlike the tools previously discussed, ReplMon provides a pleasant GUI. One of the unique aspects of ReplMon is that it illustrates how your directory replication works within the network and Active Directory topology.

## Active Directory Computer Account Cleanup

Another area of Active Directory health that tends to be neglected is computer accounts. Many organizations do not have formal policies regarding disabling and/or removing aged and old computer accounts that are no longer required. That's too bad. It is a fairly easy process to implement, and really just boils down some level of housecleaning that should be taken care of by the appropriate staff. Once a system is decommissioned, the appropriate action should be taken to clean Active Directory of the newly decommissioned computer account from its organizational unit (OU) home.

This decommissioning process can take several forms. In some organizations, it may involve disabling and moving the computer account to a specific OU to be deleted at a later date. Others choose to disable the account and leave it in place. Some organizations immediately remove the old computer account from their Active Directory.

On the surface, computer account housecleaning may not seem to be an important issue. However, it will take on a more sinister look once you start leveraging SMS 2003's Active Directory system discovery to find clients (client discovery methods are discussed later in this chapter). The tendency is for this discovery method to bring in old computer accounts that are no longer valid, presenting some unique cleanup issues when you push the Advanced Client out to systems that may or may not exist on the network. By cleaning up these machine accounts in Active Directory before you install SMS 2003, you can avoid this problem.

How can you identify these phantom machine accounts? One good utility that I have used successfully is called OldCmp, available from <http://www.joeware.net> (browse to the Windows Stuff/Free Tools section). OldCmp queries Active Directory machine accounts and identifies accounts for which the passwords have not changed in a number of days. The default assumption is that your machines registered in Active Directory will be required to change their password every 30 days. Those that have not done so may be offline or decommissioned. In your search, be sure to choose a password age value that works for your environment. If you are in an education or other seasonal business environment, for example, you may power down a large number of your desktop systems over the summer months, making them appear to not have changed their machine account passwords for 60 days. I suggest starting with a value of 90 days, which should allow for most situations. Table 2-3 lists some of the more commonly used OldCmp command-line switches.

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**Caution** OldCmp can be a dangerous tool, and using it incorrectly could pose a threat to your longevity with your current employer. Be sure to choose your command-line properties correctly and perform test evaluations of your machine accounts report to ensure you are getting only machines that have been decommissioned. Test your implementation heavily,

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**Table 2-3.** *Common OldCmp Command-Line Switches*

Switch/Option	Description/Parameters	Example
-b "<base dn>"	Specify a start point within your domain structure.	-b "cn=users,dc=domain,dc=com"
-sort <key>	Specify attribute that result set should be sorted by. Cn: Name pwage: Password age Age: Object age Os: Operating system Llts: Last logon timestamp	-sort pwage
-rsort <key>	Specify attribute that result set should be reverse-sorted by. Same parameters as -sort.	-rsort pwage
-llts	In Windows 2003 Domain Functional mode domains, force OldCmp to use lastLogonTimestamp instead of pwdLastSet for aging of accounts.	-llts
-users	Work on user accounts instead of computer accounts.	-users
-report	Report on only accounts matching query criteria.	-report
-disable	Disable accounts matching query criteria.	-disable

**Table 2-3.** *Common OldCmp Command-Line Switches (Continued)*

Switch/Option	Description/Parameters	Example
-delete	Delete accounts matching query criteria; machines must already be disabled for the deletion to work.	-delete
-move	Move accounts within a domain. Used in conjunction with the newparent switch to specify where to move the accounts.	-move
-newparent "<parent dn>"	Specify the new location where accounts should be moved. This must be used with the move option and can optionally be used for the disable option if you would like to disable and move accounts.	-newparent "ou=disabled, dc=domain, dc=com"
-safety <count>	Count how many objects to modify. The default is 10—after 10 objects, OldCmp will stop updating objects.	-safety 100
-unsafe	Perform action on all objects that match the filter.	-unsafe
-forreal	Unless this switch is specified, nothing will actually be modified in Active Directory.	-forreal
-onlydisabled	Look only for disabled objects.	-onlydisabled
-age <days old>	Specify how old the password should be for the filter to pick it up. If -llts is specified, this is how old lastLogonTimestamp should be. The default is 90 days.	-age 120
-maxage <days old>	Specify a maximum age for the password, in case you want to find password ages within a specific range.	-maxage 365
-format <format>	Specify what output format you want to use. CSV: Delimited text HTML: Standard HTML (default) DHTML: Dynamic HTML	-format dhtml
-sh	Display the report after it is created.	-sh
-file <filename>	Name an output file to write to. The default is oldcmp-<date>.htm.	-file old-computers
-append	Append a file.	-append



## SMS Schema Extensions

One of the key pieces during the installation of SMS 2003 is the extension of the schema. During the early days of Windows 2000 Active Directory services, the prospect of extending the schema was commonly perceived as a task best left to the discretion of Microsoft consulting staff. These days, extending the schema is not nearly such a serious task. It is well documented and commonly done.

When you bring up the subject of extending the schema to the staff responsible for managing the Active Directory services in your organization, most likely you will be asked why you want to do this. Here are several key reasons:

- If you do not extend the schema, you will require Windows Internet Naming Service (WINS) and the Computer Browser service. Most organizations are trying to remove the requirement for WINS on their network.
- If you extend the schema, your Advanced Clients will support global roaming.
- The schema extensions will allow for automatically updating and locating MPs and Server Locator Points (SLPs). Using WINS, only one SLP is supported.

The process of extending the schema is not overly complex. The first step is the actual extension of the schema. This adds four classes and ten attributes into the schema. Following the extension of the schema is the publishing of SMS 2003 data into the attributes contained within the classes. Once published, the data is then available to any current or future SMS 2003 site in the hierarchy. Chapter 3 covers the schema extension process in more detail.

## Network Load Considerations

When you are designing an SMS 2003 hierarchy, you need to be aware of the network structure and its architecture. By knowing the details of the network's performance characteristics, you will be able to make intelligent decisions regarding your SMS 2003 architecture. Your decisions will affect the overall structure, performance, and reliability of your SMS 2003 hierarchy.

### Available Bandwidth

Typically, one of the first items I request is a network map. This map should contain details of the physical locations, their associated network links (both internal and external facing), and the expected client numbers at these locations. If available, network bandwidth usage graphs are useful, too. These can allow you to perform some simple analysis to determine the high-consumption times and when to avoid placing additional load on the network from SMS-based activities. When requesting network bandwidth usage graphs, I suggest that you look for the following:

- A graph for a day (perhaps 24 hours of a mid-week day) allows you to see spikes in utilization that may occur on a daily basis (you may be surprised at how busy your network is at night!). Inspecting your daily utilization levels will give you the most benefit in creating sender limits and schedules (senders are discussed in the "SMS Site Communications" section later in this chapter).
- A weekly graph will give you further insight into any other activities that may take place and allow you to see some trends in evening/night bandwidth use.
- A two-month graph will allow you to see any trends of month-end activities.

By determining the available bandwidth, you can make comparisons against the loads calculated by the SMS 2003 Capacity Planner. These numbers will give you a fairly accurate estimate of the impact that you will see on the network once you are in full production.

## Network Considerations for the Advanced Client and BITS

You should be aware that you may see a load while rolling out the SMS Advanced Client to client machines on the network. You can manage this impact by rolling the client out in various ways: as a prestaged client on a new operating system image, through remote installation from SMS, by using a logon or machine startup script, or with another method.

As noted in Chapter 1, the SMS 2003 Advanced Client uses BITS when performing data transfers. BITS is preinstalled on Windows XP and Server 2003 and is available as an installable service on Windows 2000 Professional and Server. BITS is a component of IIS. BITS utilizes IIS on the server side to perform some level of communication with the client on the other end of the data transfer.

BITS allows for throttling and controlling bandwidth on the network. However, one shortcoming of BITS is that it is unable to effectively estimate the utilization on an end-to-end basis. It is only able to determine the network load at the local network adapter. It is unable to tell if a low-speed WAN link is saturated or fully available.

There are two types of BITS clients: a server version and a client version. The SMS 2003 Advanced Client installs the client version automatically during its installation process. However, the server version needs to be installed manually as a prerequisite of SMS 2003.

You should be prepared to install the BITS component as required on your SMS 2003 primary and other component servers that will house SMS-based roles. Additionally, the BITS client will be installed on your client systems. When preparing any change-control-related documents that you may require in your environment, you should mention that this component is being installed along with the SMS Advanced Client. This is of particular note if you are installing the Advanced Client in a server farm environment. The BITS client is quite inert and generally of minimal concern in most environments.

You may also consider implementing an Active Directory–based policy that allows you to perform bandwidth throttling via the BITS client. Using this approach, you can guarantee a set threshold on your SMS Advanced Clients. This is not commonly done, but is an option in bandwidth-restricted environments. Chapter 8 includes information about configuring the bandwidth used by BITS.

## SQL Server Considerations

Since SMS requires a database backend, we need to discuss some SQL Server considerations when implementing SMS 2003. SQL Server is your only database option for running SMS 2003.

You may have purchased an associated license for SQL Server with SMS 2003 or a separate SQL Server license. As a general rule, if you purchase SMS 2003 with the SQL Server license, it is cheaper than a separate license for SQL Server. However, you are limited by the license agreement to use that SQL Server installation only for that SMS 2003 installation. Be sure to consider which approach is most cost-effective for your organization.

To be sure you have configured SQL Server for optimum performance, consider the following settings in your SQL Server installation for SMS 2003:

*User connections:* Ensure that there are enough user connections configured for use. While the default value is unlimited; you can reserve a specific number of connections during the setup process of SMS 2003. Be sure you do not have a finite value defined within SQL Server.

*Memory:* Too little available memory will greatly hinder SQL Server's performance. You can configure how SQL Server will use available memory or RAM. The default is set to dynamically configure SQL Server's memory consumption, so that the amount of memory it uses is determined by its current demand. With this setting and a large database, SQL Server could easily consume most available RAM, thus hindering system performance. You may restrict the amount of memory available to a finite amount, eliminating this potential issue. The downside of this

approach is that it may limit the size of database that may be used, which could result in problems if misconfigured on larger databases. Table 2-4 shows the Microsoft-recommended memory configuration values for SQL Server with SMS 2003. Realistically, most servers will exceed these memory values and will likely not experience memory-related issues.

*Database location:* With SQL Server, you have the option of not having the database reside on the same server as the SMS 2003 primary site server. If you use this model, you should ensure that the SMS Service account and either the SMS SQL Server login ID or the group account (used by SMS) have access to the SQL Server database via the network.

*SQL Server startup:* Make sure to set SQL Server to start up at system startup time. To do this, run SQL Server Setup, select Set Server Options, and then check the Auto-start Server at Boot Time option.

**Table 2-4.** *Recommended SQL Server Memory Configurations*

Server Memory	OS and SMS Services	SQL Server
128MB	80MB	48MB
256MB	160MB	96MB
384MB	224MB	160MB
512MB and greater	256MB	256MB and greater

In some organizations, a database administrator (DBA) will be responsible for SQL Server installation. In this case, the SMS administrator should discuss these requirements with the DBA before proceeding with SMS installation, and be sure to document any required changes!

## Client Discovery Methods

SMS 2003 offers several ways of discovering clients that exist in your network environment. Most of the discovery methods find the same resources, but some discover unique resource types such as user accounts and Active Directory OU memberships. You can choose the discovery method that best suits your environment and configure the discovery schedule and other key elements, such as domains and Active Directory containers.

You can choose from the following discovery method types (you may use any number of these methods):

*Network Discovery:* This method allows your SMS 2003 infrastructure to perform scans of your network to find new client systems. You configure the discovery type and discovery scope to tell SMS how and where to operate this discovery type.

*Heartbeat Discovery:* I have three simple words about the Heartbeat Discovery method: keep it enabled! This method is used to keep existing client discovery data records (DDRs) up-to-date so that they are not deleted from the SMS database.

*Windows User Account Discovery:* This method discovers only user accounts. By discovering these types of resources, you can target software distribution based on specific user accounts. The disadvantage of this approach is that the software tends to follow users. If they log on to another machine that should not receive the software, it may be loaded there inadvertently.

*Windows User Group Discovery:* This method discovers only user account groups. For example, you could target a specific application to all Accounting users. As with the Windows User Account Discovery method, a potential problem with this approach is that the software is downloaded to the machine from which users log on.

*Active Directory System Discovery:* This method discovers Active Directory computer accounts. This, and the following two types of Active Directory discovery methods, can be useful when forming collections or groups of systems and users to target for software distributions.

*Active Discovery User Discovery:* This method discovers Active Directory user accounts.

*Active Discovery System Group Discovery:* This method discovers Active Directory group memberships.

The discovery methods are configurable on a site-wide basis, with the exception of the Network Discovery method, which allows you to discover resources that exist outside the SMS site boundaries. Chapter 3 provides details on configuring client discovery.

## Multiple Site Considerations

SMS 2003 is fairly easy to design and install in smaller environments that have a single location or very well-connected locations. However, there are some special considerations when your organization extends over larger areas, multiple branch offices, or smaller clients that do not have good connections. To configure SMS 2003 optimally for this environment, you need to consider the setup of your primary site, secondary sites, and possibly Proxy Management Points, as well as the communications between these sites.

### Primary Sites

As discussed earlier in this chapter, by using the SMS 2003 Capacity Planner, you are able to try out several variations of SMS 2003 configurations. Trying varied configurations can assist you in developing an optimal structure that will have the least impact on your network infrastructure.

You may have multiple primary sites in an organization, but you must have SQL Server databases in place to support those. Each primary site will be configured with its own site code.

The other primary sites, or *child primary sites*, may be connected to other parent primary sites or have secondary sites connected below them. The overall design forms a tree-type architecture. You should try to keep this tree structure as flat and simple as possible, as it introduces latency into the operations of the SMS 2003 hierarchy. Organizations tend to try to limit the number of primary sites, as each one requires a SMS 2003 Server license and also a SQL Server license. This can get expensive and should not be architected unless a need to do so is clearly demonstrated during capacity planning.

### Secondary Sites

As noted in Chapter 1, secondary sites do not have a SQL Server database associated with them. Secondary sites also have lower hardware requirements than primary sites. You can place these sites more liberally throughout your enterprise. Of course, you don't want to add secondary sites unless you need them.

You may decide to install a secondary site because you have a small or congested network link separating the branch or remote location from the remainder of the network. By placing a secondary site in this location, you can configure a sender to control the transfer of SMS 2003 data to that location, and you are able to perform bandwidth throttling and scheduling. (Senders are described in the

upcoming “Site Communications” section, and configuring them is discussed in Chapter 3.) This is of particular interest when you are placing a DP in this location. Typically if you have a smaller location, a congested location, or large number of clients at a remote location, you will place a DP there. The problem is that you don’t always want the contents of a SMS package to be replicated to that remote DP at full throttle, especially at a prime time of day during business hours.

You may also choose to use a secondary site to reduce the amount of traffic between your clients and the primary site by using a Proxy Management Point (PMP), as described in the next section.

## Proxy Management Points (PMPs)

By placing a PMP at a secondary site, you can restrict or control the transfer of data from the clients to the primary site, typically at or near the top of your SMS 2003 hierarchy, and vice versa. A PMP can collect the communications from the clients, and queue and compress them in preparation for transfer to the primary site server.

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**Note** An SMS Advanced Client can be assigned only to its primary site. This means that it will retain that site’s site code, even if the secondary site may have a PMP located within it.

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The PMP is able to receive inventory data from clients and convert it to XML. Once the data is converted, it transfers the newly formatted data to the secondary site to be compressed and transferred to the parent primary site. It performs this transfer using the specified scheduling and throttling from the configured sender. The secondary site is able to send this data to the parent primary site in batches, as many clients may be reporting inventory during the same interval.

The PMP has certain advantages for software distribution requests, too. Although it will not cache policy requests for users and machines, it will cache the actual policy body containing the details of a particular advertisement. Requests to locate a DP for an advertised package are not cached, as they are unique to each client.

Again, without trying different configurations in your capacity planning analyses, you don’t really know the cost or benefits in placing a PMP in your remote site. If you have a location with a small number of client systems, the PMP may actually cost more in transferring data than if you did not have one configured at that location. Once your client base grows, the benefit starts to outweigh the network traffic cost.

If you really need to reduce the amount of network traffic flowing across the WAN link to your secondary site and PMP, you may look at another technique using SQL Server replication. In performing SQL Server replication to your secondary site, the PMP is able to route its queries against that replicated database. Of course, now you are replicating SQL Server tables and stored procedures across that WAN link. Again, you need to examine the costs and benefits of doing so. This may be a viable solution if you have a large number of clients across a saturated or small WAN link. To implement this specific configuration, you must be familiar with SQL Server replication. You need to configure the PMP to look at the replicated SQL database using the SMS Administrator console. It really boils down to doing your homework and working through several scenarios with the SMS 2003 Capacity Planner.

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**Note** For further information about using SQL Server replication, see the “Planning for SQL Server Database Replication” section in Appendix E of the Microsoft document “Scenarios and Procedures, SMS 2003 Planning and Deployment” (<http://www.microsoft.com/technet/prodtechnol/sms/sms2003/deploy/spgsgms03/spsgms01.mspx>).

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## SMS Site Communications

In order for SMS 2003 sites to communicate with each other, you need to define the mechanisms that will be used to perform the communications, as well as the parameters for the communications.

Two key concepts to consider when designing the communications parameters for your sites are senders and addresses. *Senders* describe the network link or media that will be used. *Addresses* describe the location or destination of the data being sent. You can think of addresses as the path or trail that the communication follows, and the sender as the method of how that data is transferred through it.

### Senders

When you are designing an SMS 2003 hierarchy, you may have multiple sites. To facilitate the communications between multiple SMS sites, you define senders to describe the network media and bandwidth scheduling that should be conformed to by the SMS site. If you have a single SMS site, you do not need to worry about configuring senders, as there are no other destinations to receive data.

All sites within a hierarchy use senders to transfer data. This data may be destined to parent site servers or child site servers. The data transferred includes configuration, collection, package, and advertisement information. By using a sender for this data, you can optimize the delivery and perform some bandwidth scheduling to conserve network bandwidth during certain time periods. Limiting and scheduling bandwidth provides one of the most compelling reasons to design your SMS 2003 implementation with multiple sites.

You can configure the following types of senders in SMS 2003:

- Standard Sender, for all LAN communications. A Standard Sender is also used for WAN communications when routers are connected with LAN segments.
- Asynchronous RAS, for Remote Access Service (RAS) communications over an asynchronous line.
- ISDN RAS, for RAS communications over an ISDN line.
- SNA RAS, for Systems Network Architecture (SNA) communications over an RAS line.
- X25 RAS, for RAS communications over an X.25 line.
- Courier Sender, to send and receive SMS packages through CDs, floppy disks, or tapes. A Courier Sender is typically used to send large volumes of data when available bandwidth is insufficient to transport the data.

The Standard Sender is the type you will likely use most often. When you use another sender type, be sure that it is configured correctly from the Windows server perspective. Chapter 3 describes how to configure senders using the SMS Administrative console.

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**Note** Not all types of site communications will use the senders or their configured scheduling. For example, senders will not be used when you send data using the SMS Administrator console or Remote Tool connectivity to SMS sites elsewhere in the hierarchy, or for SLP and MP communications by clients.

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### Addresses

In order for the senders that you define to operate correctly, you must define the route, or address, of locations for communications. You define these addresses to specific parent and child sites, and on occasion, across to another site that may be adjacent to the current site.

You need to define an address for each communication destination site. Addresses are sender-specific, meaning that for each communication destination, you must configure a different address for each sender that you will use in communicating with that site. You may configure multiple addresses, each with a different sender to provide some form of redundancy. If communications are lost between sites, and if all senders are unable to provide connections, the site will continue to collect all its data and wait to transfer it once connectivity is restored.

You do not necessarily need to configure senders and addresses for both directions of communications. You can configure only one direction, which will allow data to flow only in that direction. This can be useful in some site-specific configurations, or it could be an issue if misconfigured.

Chapter 3 describes how to configure addresses using the SMS Administrative console.

## SMS Site Boundaries and Client Roaming

Site boundaries define the logical area of your network where client systems may reside and be managed by SMS 2003. If a client machine exists outside these boundaries, it may be discovered, but it will not be subject to management by SMS 2003.

SMS boundaries are defined by IP subnet and/or Active Directory site boundaries. When you set up your SMS clients and SMS site boundaries, keep the following points in mind:

- Your SMS sites should be defined by Active Directory site boundaries. This means that your clients should be running Windows 2000 or later to take advantage of Active Directory/SMS site boundaries.
- If you have any low-speed subnets such as wireless, dial-up, or VPN, they should be defined by their own subnets and site.
- Ensure all your local site boundaries are included as local roaming boundaries.
- Your Legacy Clients will be included in an SMS site if their IP address or Active Directory site name is within the defined SMS site boundaries.
- Your Active Directory sites should not cause SMS site boundaries to overlap; this ensures clients are assigned to only one SMS site.

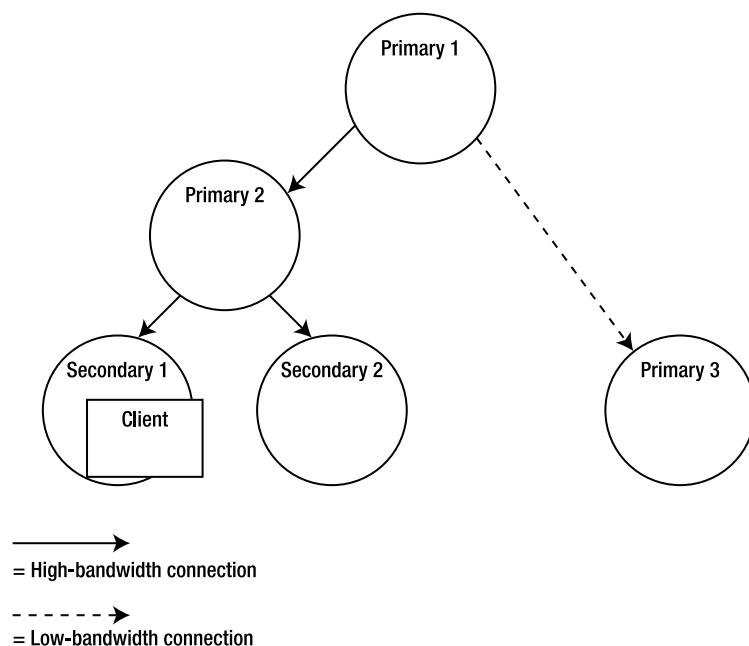
When an Advanced Client moves from one IP subnet or Active Directory site within an SMS 2003 site to an IP subnet or Active Directory site within another SMS site, it is said to have *roamed*. Only SMS 2003 Advanced Clients may roam within the enterprise and still have effective connectivity.

When you configure your SMS site boundaries, you have the opportunity to configure the roaming boundaries. These may be local roaming boundaries or remote roaming boundaries. By defining the type of roaming boundaries, you can control how the Advanced Clients will behave when locating and accessing DP resources from these locations.

Laptop users are prime candidates for roaming due to their portable nature. Without the use of roaming boundaries, the roaming client would still access the same SMS 2003 site resources as it did when it originally connected to a site. When SMS 2003 roaming boundaries are configured correctly, an Advanced Client is able to move freely between IP subnets and Active Directory sites and have connectivity to whichever SMS 2003 site resource is closest to it. This optimizes bandwidth use for maximum responsiveness and efficiency.

Even though an Advanced Client may roam from one site to another, its site assignment will remain the same. Once the Advanced Client is installed on a client system, it is typically configured for automatic assignment of its SMS site based on SMS site boundaries. Roaming boundaries can be configured by IP subnet, IP address, and/or Active Directory site name. You can also configure the client so its site assignment remains static, regardless of the IP subnet or Active Directory site from which it connects.

The concept of client roaming is illustrated in Figure 2-3. In this figure, Client 1 is located in site Secondary 1. With correctly defined site boundaries, Client 1 is able to access localized resources such as DPs and MPs in each of the primary sites above its current location. Since the Primary 3 site is connected by a low-bandwidth connection and is defined as a remote roaming site, you can change the behavior of the Advanced Client when it is located in that site.



**Figure 2-3.** Client roaming configuration

## Roaming Clients and MPs

Advanced Clients interact with MPs, but are assigned to a default MP. All policy information, such as inventory data, is always sent to this MP (unless a PMP has been configured and is available for that SMS site). This is called the *assigned MP*.

The *resident MP* is the default MP of the SMS site in which the SMS Advanced Client is currently located. As a client roams, it will use the resident MP as its assigned MP, depending on the roaming boundary in which the client is currently located.

If you have configured a secondary site, an additional MP can be configured and assigned to that secondary site. This additional MP is called a PMP, as described earlier in this chapter. The PMP services the Advanced Clients that are in its roaming boundaries and are assigned to its parent primary site. While roaming, an Advanced Client will send its package source location requests to its resident MP. However, all other policy information will be sent to either the PMP or to the assigned MP, if a PMP does not exist. All messages, except for Advanced Client policies, are compressed during transmission to the MPs.

When roaming, an Advanced Client attempts to locate a resident MP through Active Directory. Active Directory will then provide the client its assigned MP if it is within an assigned site. Additionally, the assigned MP will be used for package source location requests, where information about the available DPs is then sent back to the client.



## Roaming for Software Distribution

A key factor in how Advanced Clients will access advertised programs on DPs in roaming boundaries is how the program advertisement properties are configured.

Upon receiving an advertisement, the Advanced Client determines if the advertised package and program are available locally to the client within the local roaming boundary. One of two actions will take place:

- The package will be executed directly from the DP location.
- The package will be downloaded before it is executed.

If the advertised package and program are both unavailable locally, and the Advanced Client is within a roaming boundary—one of three actions will take place:

- The package will not run.
- The package will be downloaded from the remote DP before being executed.
- The package will be run directly from the remote DP.

If the Advanced Client is unable to be located in the current site that it is contained within, the client will revert to its assigned site to make a package source location request to its assigned MP. That MP will then provide the location(s) of the DPs that are available to the client. If the Advanced Client finds that the package source files are available locally, but are not accessible (possibly due to the package being updated), the client will not revert to its assigned site to access another instance of the package. This is intentional, as it will protect the WAN links against undesired or unanticipated traffic, if a DP has failed or if the package contents are unavailable for other reasons. If all conditions are favorable—the package is available and the advertisement is configured to download before executing—the client will download the entire package, and then execute the package contents.

## Local Roaming vs. Remote Roaming Boundaries

Out of the box, all SMS site boundaries are set as local roaming boundaries. By configuring local roaming boundaries, you define that the portion of the network is well connected to the remainder of the network and thus able to access DPs safely across its WAN links. You are able to explicitly define how the packages are executed by configuring the package options as download and execute or execute from the DP location.

By defining a boundary as remote, you can configure an additional set of parameters in the package properties, further defining how this package will be executed in these locations. For example, suppose that certain areas of your network are connected by low-bandwidth links, or maybe the clients are connected via a less reliable medium, such as a wireless protocol. This area of connectivity is separated by an Active Directory site, or at least defined as a separate SMS boundary. This boundary is a remote roaming candidate. By configuring it as a remote roaming boundary, you can specify that the package properties dictate how the client will handle the package—perhaps as download and execute, or maybe even not available, considering the low bandwidth available within that boundary.

Continuing with the example, assume that a second area of your network consists of desktop computers with a 100MB wired connection. There is little expectation of anyone moving these machines around, and it's unlikely that the connectivity will be interrupted. This area of your network may be another city location and have SMS 2003 resources located in it. You would likely define this as a local roaming boundary. You could then define that the packages could be executed directly from the DP in this area.

In summary, the Advanced Client roaming boundaries work as follows:

*Local roaming boundary:* A roaming boundary in which the site DPs are locally available to the Advanced Client, and software packages are available to that client over a well-connected link. Advertisements sent to Advanced Clients specify whether the Advanced Client downloads the package source files from the locally available DP before running the program.

*Remote roaming boundary:* A roaming boundary in which the site DPs are not locally available to the Advanced Client. Advertisements sent to Advanced Clients specify whether the client downloads the software program from a remote DP before running it, runs the package from a remote DP, or does nothing and waits until a DP becomes available locally.

By deciding how you want the Advanced Clients to handle available packages, you can determine how to configure specific boundaries. Generally, you would define areas as remote roaming boundaries for two reasons: if you *do* want the Advanced Client to download and execute the package contents when its subnet is located in the boundary, or if you *don't* want the Advanced Client to download and execute the package contents when its subnet is located within the boundary.

Bear in mind that the package properties dictate how that package is handled. Defining the roaming boundary type dictates which set of package properties is used.

If your Advanced Client is not located within any of the defined roaming boundaries, it will revert to its originally assigned site for policy and all other site-related communications. The client is still able to access its package files, but they will be received from a remote DP. Alternatively, if the DPs of the site are remote to the Advanced Client's location, and a BITS-configured DP cannot be located, the package files will be downloaded using Server Message Block (SMB).

## Protected Distribution Points

Another configuration related to local and remote roaming boundaries is called *protected DPs*. By protecting a DP, you can limit or restrict the scope of clients that are able to access the specific DP resources. In a simple single-site configuration, you may have little or no use for this type of configuration. When your SMS 2003 hierarchy extends beyond its immediate LAN confines and traverses WAN links of varying utilization and bandwidth, the benefit of protecting DP resources becomes apparent.

By default, an Advanced Client will choose a DP within its site boundaries at random. This will ensure some form of load-balancing between clients and local DPs. This does not present a problem, until a client attempts to access a DP that is located across a low-bandwidth link. That subnet may be included in the site boundaries, but it may not be desirable for clients to be accessing that distant resource across the low-speed link. You can protect that DP from being accessed by clients located outside the defined protection boundaries.

For example, suppose you have a remote location with a small number of clients. The remote location is connected to the primary location by a low-speed WAN link. There is little justification traffic-wise to separate this site as an additional SMS 2003 site. You place a DP to bring package content closer to the clients in that remote location. By protecting this DP in this remote location, you limit the clients that are able to access it to the scope configured in the DP properties, thereby eliminating the possibility of incurring WAN traffic that you did not expect. The converse of this is also true—you may want to restrict the remote location clients from accessing the DP located in your primary location.

Keep in mind that you are removing some forms of redundancy when you protect DPs. Since this protection is limited only to DPs, other forms of client-to-site communications are still allowed across the WAN link. To calculate the potential impact of these communications, be sure to run your site configuration through the SMS 2003 Capacity Planner, as explained earlier in this chapter.

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**Tip** You may want to check out the new System Center Capacity Planner 2006 tool from Microsoft. It is available with your TechNet subscription. For more information, see <http://www.microsoft.com/windowsserversystem/systemcenter/evaluation/capacity/default.aspx>. It currently only supports the capacity planning for Microsoft Operations Manager and Exchange. It is expected to support SMS in future releases.

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## Regional and Global Roaming

If you chose not to extend the Active Directory schema, or if Active Directory is not available on your network (yes, contrary to some published articles, SMS 2003 does not require Active Directory), your Advanced Clients can still roam, but only to sites that are lower in your hierarchy than from where they originate. Roaming at these lower levels allows these clients to still receive packages and programs from DPs. This roaming to lower sites is called *regional roaming*.

If you do have Active Directory available on your network and choose to extend the schema (as discussed in Chapter 3), another roaming feature exists for your clients. The schema extension allows for *global roaming*. This will allow the Advanced Client to roam to sites at higher levels than from where it originates. Additionally, the client may then roam down branches of these sibling sites and still receive software packages from those site's associated DPs.

## Summary

We have covered a lot of ground in this chapter to help you plan for your SMS 2003 installation or upgrade. You learned that the SMS 2003 Capacity Planner provides capacity-planning calculations and allows you to investigate what-if scenarios. Using it, you can determine network consumption and some basic server hardware requirements. We also went through some basic Active Directory health checks that you can perform, and covered how to clean out your old computer accounts, too.

Next, we looked at the various SMS client discovery methods, followed by the considerations for multiple-site configuration. Finally, you learned about SMS site boundaries and client roaming, including local and remote roaming for mobile users.

