AUTHORIZED DOCUMENTATION

System Planning, Deployment, and Best Practices Guide

Novell®
ZENworks® 10 Configuration Management

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About This Guide

The purpose of this *System Planning, Deployment, and Best Practices Guide* is to describe the items that need to be considered when designing a Novell ZENworks 10 Configuration Management solution and deploying it across small and large scale enterprises.

The information in this guide is organized as follows:

Audience

This guide is intended for ZENworks administrators.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation, or go to the Novell Documentation Feedback site (http://www.novell.com/documentation/feedback.html) and enter your comments there.

Additional Documentation

ZENworks Configuration Management is supported by other documentation (in both PDF and HTML formats) that you can use to learn about and implement the product. For additional documentation, see the ZENworks 10 Configuration Management SP3 (10.3) documentation (http://www.novell.com/documentation/zcm10/).

ZENworks Configuration Management: A Single Solution for Systems Management

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The purpose of this *System Planning, Deployment, and Best Practices Guide* is to describe the issues you need to consider when designing a Novell ZENworks 10 Configuration Management solution and deploying it across small and large scale enterprises. This guide is not meant to replace the other online resources that Novell provides to customers and partners, but to supplement that material so that you have a better understanding of certain design-related topics and requirements.

ZENworks Configuration Management is also supported by other documentation (in both PDF and HTML formats) that you can use to learn about and implement the product. For additional documentation, see the ZENworks 10 Configuration Management SP3 (10.3) documentation (http://www.novell.com/documentation/zcm10/index.html).

This following sections contain more information:

- Section 1.1, “The Goal: Total Management, Zero Effort,” on page 9
- Section 1.2, “The Management Paradigm,” on page 10
- Section 1.3, “The Solution: ZENworks Configuration Management,” on page 11

1.1 The Goal: Total Management, Zero Effort

Over the last decade, Novell ZENworks has provided the gold standard for centralized configuration and management of network endpoints in today’s complex, heterogeneous corporate networks. ZENworks Configuration Management is a key implementation of ZENworks technology, enabling policy-based automation of software and patch deployment, asset tracking, endpoint security, OS migration, and many other routine tasks.

With ZENworks Configuration Management, IT staff can synchronize the Windows desktop environment with their company’s business policies, while saving IT time, budget, and resources for strategic projects. All of this focuses on the ZENworks goal to provide total network management while bringing the associated management effort as close to zero as possible.

Introduced in the last quarter of 2007, the latest version of ZENworks Configuration Management moves toward that goal by using a completely redesigned architecture to greatly simplify, consolidate, and integrate policy-based management of Windows network endpoints, including systems running Windows 7.

The latest version of ZENworks Configuration Management does the following:

- Provides a single modular architecture, platform, and agent for all ZENworks products
- Provides a unified, Web-based administration console
- Uses only standards-based protocols
- Reduces overall wire traffic

- Allows full manageability over the Internet
- Simplifies and speeds installation, deployment, and updates

1.2 The Management Paradigm

All design features of the new ZENworks Configuration Management architecture flow from the basic Novell philosophy of the Open Enterprise: a simple, secure, productive, and integrated IT environment across mixed systems. ZENworks Configuration Management empowers IT staff to manage systems to support real users, with all their various security, location, device, and other needs, while keeping simple, centralized control over the entire end-user environment. It also supports the idea that IT staff should be empowered to manage systems according to the paradigm that best reflects the organization's business policies and the IT staff's preferred working style.

ZENworks Configuration Management provides the flexibility to manage systems tactically (on a device-by-device basis) or strategically (in synchronization with business policies), using any combination of the three following distinct management paradigms:

- Section 1.2.1, "Management by Exception," on page 10
- Section 1.2.2, "User-Based Management," on page 10
- Section 1.2.3, "Device-Based Management," on page 11

1.2.1 Management by Exception

Two of the most important considerations when evaluating any configuration management solution are how well the administration design scales and what burden it places on the IT staff as they update the solution to accommodate changing business policies. Novell is a pioneer of "management by exception," and ZENworks Configuration Management continues to offer this powerful method of continuously adapting, with minimal IT effort.

Management by exception is a complement to policy-driven management. Management by exception allows the general rules of configuration management to be at a high level across user or device groups, while permitting exceptions at a more granular level to accommodate more specialized needs.

For example, normal business policies might allow employees to remotely access the corporate network. However, applying this policy across the board to all desktops, including devices in the finance and legal departments, could expose the company to regulatory penalties and corporate spies. Exception-based management allows IT staff to create and automatically enforce general access policies, as well as more restrictive policies that are enforced on top of the general policies to protect devices and users that require a higher degree of security. In this case, the exception policy restricts access to normal business hours, on-site, and by authorized users. Exception-based management allows for complete flexibility in accordance with business policies, without requiring IT staff to manage separate policy silos for each type of user and machine.

1.2.2 User-Based Management

User-based management, which leverages user identities, group roles, and business policies, is the gold standard for automation, security, and IT control. User-based management has always been a Novell specialty. Although the underlying architecture has been dramatically enhanced in ZENworks Configuration Management, the full power of user-based management has been retained.

True user-based configuration management separates users from the specific devices they use, and treats the users as the company's most valuable asset to be managed. Devices serve their proper role as tools. Allowing users, rather than devices, to be managed as a first-class configured entity means that policies, applications, and other configuration details can follow users from device to device. User-based management also ties IT policies directly to business policies, which increases responsiveness to changing business conditions. User-based management also leverages identity stores and business systems across the enterprise to eliminate errors, increase security, standardize workflows, document regulatory compliance, and support effective decision making.

User-based management can be defined as strategic, while device-based management is tactical. In ZENworks Configuration Management, both can be mixed and matched according to business and IT requirements by using management by exception. For example, a general policy can be applied to a specific device and then overridden, depending on the identity information for the user who is currently logged on. Or, a general policy based on user identities and roles can be overridden, depending on the device being used and its context, such as a mobile device attempting to access the network from beyond the firewall.

1.2.3 Device-Based Management

Many organizations base their configuration management practices on the devices being managed. In fact, this is the default method used by most of the configuration management products on the market today. Without user-based and exception-based policy management, products that target specific device configurations treat actual business policies and user needs as an afterthought—essentially equating a specific user with a specific device. Applications, policies, and other configuration information are associated to a managed device or set of managed devices. This approach tends to force users into rigid roles instead of supporting users as dynamic participants in evolving business processes. For that reason, Novell has not focused on device-based management in the past.

However, the new ZENworks Configuration Management architecture adds device-based management as a tool that can be used, in addition to the other management styles, to fill specialized needs. For example, manufacturing-floor devices, public kiosks, and call centers where multiple users work different shifts and share a single device are all instances where device-based management might be more appropriate than user-based management. Additionally, companies that normally rely on user-based management might need the ability to quickly set up a device for one-time use. For example, a customer might need to configure a device to auto-run a presentation in a conference center without the bother of creating a new "user" for this one instance. With the new ZENworks Configuration Management architecture, customers now have the option of using device-based management whenever it suits their specific needs.

Because device-based management is the most familiar method to most IT professionals, and because it is the fastest way to configure a device in the short term, before setting up long-term user-based policies, device-based management is the default management model after installing ZENworks Configuration Management.

1.3 The Solution: ZENworks Configuration Management

ZENworks Configuration Management is based on an entirely new architecture designed to provide a secure, highly usable, open environment for managing all of your Windows devices. ZENworks Configuration Management provides you with a single, modular architecture that maximizes flexibility and scalability, simplifies and speeds management throughout the device life cycle, minimizes processing demands on managed clients, reduces bandwidth consumption for management processes, and uses standards-based protocols to seamlessly integrate with your choice of user directories and object databases.

ZENworks Configuration Management lets you manage systems based on user identities, roles, groups, and locations, so IT can work seamlessly with the company’s business organization and policies. ZENworks Configuration Management gives you a secure, Web-based console for unified control over all management tasks, from virtually anywhere.

If your organization is undertaking an Information Technology Infrastructure Library (ITIL) initiative, ZENworks Configuration Management is the right choice for you. It has been built as a modular set of components that use industry standards to build a product and set of solutions that completely aligns with ITIL best practices and disciplines.

To find out more about our vision, visit the Novell ZENworks Configuration Management product page (http://www.novell.com/zenworks) and download the white paper entitled *A Blueprint for Better Management from the Desktop to the Data Center*.

Performing Pre-Design Activities

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A firm understanding of the organization's business and technical requirements and the existing infrastructure components that will take part in the Novell ZENworks Configuration Management system is the first step in developing a solid design that meets the organization's immediate and future needs.

IMPORTANT: Throughout this document, we refer to the need for proper documentation. Documentation is of the utmost importance. Documentation is a complete and accurate reference to the system you have designed and built, but most importantly, it is a reference for the future. As individuals transition in and out of the IT organization, the design documents become a reference as new employees learn the infrastructure they support, including techniques, policies, and design decisions. Documentation is also a good reference for others inside the organization who might not be involved in the day-to-day management of the ZENworks Configuration Management environment, but are involved in the management of other projects that might have an impact on the ZENworks Configuration Management environment, including dependencies.

The following activities should be performed during the pre-design phase of implementing ZENworks Configuration Management:

- Section 2.1, "Perform a Business Assessment," on page 13
- Section 2.2, "Perform a Technical Assessment," on page 14
- Section 2.3, "Gather Other Critical Information," on page 15
- Section 2.4, "Develop High-Level Design," on page 16
- Section 2.5, "Develop Documentation," on page 16
- Section 2.6, "Outputs from Pre-Design Activities," on page 17

2.1 Perform a Business Assessment

Your first need is a detailed business assessment. If you do not have a solid understanding of what the overall business (or individual business units) needs or desires, you cannot design a solution to meet business needs.

Systems management software affects the entire business, so the various departments should provide input and influence on what the system should look like. This does not mean that departments outside of IT need to understand the technical complexities of the infrastructure and how it is designed; they simply need to provide business requirements to the IT organization so that their needs are met.

The best way to handle this is through a set of informal workshops, which include high-level introduction to the technology, what it does, how the departments and end users benefit, and possibly a short demonstration of the product. The three main reasons you hold these workshops are to inform departments of what you are doing, get their buy-in, and get their feedback in the form of technical requirements. The meetings should sufficiently inform department members so they begin to give you feedback as to how they will leverage the system.

The following list presents some ideas on how to perform the business assessment. You might think of more ideas; use your imagination and tailor your business assessment according to each organization's unique landscape.

- Hold informal workshops and invite leaders from each department.
- Survey departmental leaders and find out what they need to become more effective in their roles. Find out how their staff can become more effective, given the software you are deploying. Getting departmental leaders to answer a written survey can be very effective and can give you detail that can be used when building both the high-level and the detailed designs. A sample survey is provided in Section D.2, “Sample Business Requirements Survey Questions,” on page 123.
- Make sure you completely understand how the organization is dispersed and which departments of the organization are represented at each of its physical locations.
- Make sure you understand the monthly cycles for each of the departments in the organization. This will assist you with determining peak times when the organization cannot afford to be impacted by downtime.
- Determine whether the organization is going through an ITIL (IT Infrastructure Library) initiative. This has a direct impact on the solution you design and the services you provide. If there is an initiative underway, you need to be involved in it and be completely informed. You want to avoid making design changes mid-project because of the output from another project.

2.2 Perform a Technical Assessment

Your next need is for a technical assessment to review what you already have, identify what you need, and document your requirements.

It is important to note that the technical assessment should be performed at the same time as the business assessment. The two assessments should take no longer than a week to perform, depending on the size and complexity of the organization and its infrastructure.

You need to have a good understanding of the existing infrastructure well before you introduce ZENworks Configuration Management into the environment. In order to do this, you should hold a set of workshops or meetings to obtain the information you need.

The two main outputs from a technical assessment are documentation on your findings, along with a set of tasks that you need to perform. Information that you should gather includes the following:

- Which operating systems must be supported?
- How many users must be supported by the proposed solution?
- Will there be support for roaming users?
- How many offices and sites must the solution support, and how many users are at each location?
- Where are data centers located?
- What is the network architecture, with details on link speeds, and so forth?
- Will existing servers will be leveraged to support the ZENworks Configuration Management infrastructure?

If so, you should gather the following software and hardware information:

- Service pack levels (and whether they meet the minimum requirements for ZENworks Configuration Management as listed in "Primary Server Requirements" in the *ZENworks 10 Configuration Management Installation Guide*)
- Other software, for example, .NET.
- CPU and memory requirements (and whether they meet the minimum requirements for ZENworks Configuration Management)
- IP addressing for all servers and other devices that will be part of the ZENworks Configuration Management infrastructure
- Previous versions of ZENworks that might already be hosted

- What is the DNS infrastructure?
- What is the DHCP infrastructure?
- How should the IP subnet design be handled?
- Which network access methods (VPN, Access Manager, and so forth) must be supported?
- Which network infrastructure components and design (DMZ, NAT, and so forth) must be supported?
- What is the directory services design, including which directory services are being utilized (Novell eDirectory, Microsoft Active Directory, and so forth), and for what purpose (Application support, LDAP, and so forth)?

2.3 Gather Other Critical Information

You should also be familiar with other services that are running on the network and that rely on the infrastructure. You should prioritize these services to better understand bandwidth utilization and service levels that have been assigned to specific functions. If the customer is implementing ITIL best practices, you should know about all disciplines that are currently being leveraged.

You should collect information about the following:

- Which Service Desk software is currently used by the customer, and how does the deployment of ZENworks Configuration Management fit within this framework?
- Does the customer have a formal Service Level Agreement (SLA) process in place? If so, what is it and can you access the documentation that explains it?
- What is the customer's Disaster Recovery and Service Continuity plans? How does this impact the ZENworks Configuration Management design?
- How does the customer plan for availability of services and resources? Is the customer fully aware of availability requirements?
- Does the customer leverage a Configuration Management Database (CMDB)? If so, which CMDB? Does the customer have plans to include information that is stored in the ZENworks database in their CMDB?
- Does the customer have a formal method for keeping track of changes to applications that are published to the end-user communities?
- Does the customer have a Definitive Software Library (DSL) and Definitive Hardware Library (DHL)?

- Is the customer using another framework product in its infrastructure, such as IBM Tivoli, CA Unicenter, or HP OpenView?
- Does the customer leverage other products, such as SAP?
- What other major projects are currently taking place at the customers sites?

2.4 Develop High-Level Design

After you have completed gathering data to use when building the design of the infrastructure, you can then develop a high-level design. It is important at this point to understand what the infrastructure is going to look like, so documenting your high-level thoughts and plans is critical to the success of the project.

Developing a high-level design consists of building two main outputs:

- **Assessment document:** A high-level design document outlines the general placement of services across the company's infrastructure. This document does not need to identify servers to be utilized or deployed to host the specific ZENworks services. The document should simply outline the services themselves, and where they will reside across the network. Your high-level design should include the following information:
  - Number of ZENworks Management Zones needed
  - Placement of Primary Servers
  - Placement of Satellite devices
  - Placement of the Database Servers
  - Services that run at each location, based on the requirements gathered during the business assessment.
  - Configuration of network services, such as DNS (forward/reverse lookup), DHCP, and so forth
  - Utilization of network infrastructure, such as L4 switches to front the Primary Servers, Satellite devices, or both
  - Remote access capabilities
- **High-level graphical design diagram:** As a supplement to the assessment document, you should also develop a graphical representation of the infrastructure. This diagram should reflect exactly what you have described in the document, and it should be at a high enough level so that everyone can see what the infrastructure is going to look like after the ZENworks Configuration Management deployment is complete.

2.5 Develop Documentation

It is important to develop your documentation and then discuss it with all parties that have an interest in the success of the project. Discussing the findings and recommendations in detail is important to the success of this phase of the project and the success of the more detailed design phase.

After you have conducted meetings to discuss the findings and recommendations, there will be items in the high-level design that must be modified or changed. This is normal. Ensure that you capture the changes and include them in documents you created during this phase. This is important so that you have accurate information throughout the life cycle of the project. The information in these documents will be leveraged during the design phase, so it needs to be complete and accurate.

2.6 Outputs from Pre-Design Activities

As mentioned in Section 2.4, “Develop High-Level Design,” on page 16, there are two main outputs (or deliverables) from your pre-design activities:

- **Assessment document:** This document highlights all of your findings from the business and technical assessments that you perform. The document is the foundation for performing your design activities, and needs to be kept up to date. The document includes information such as:
    - Requirements gathered during meetings and workshops with department leaders and others inside the organization that will have an influence on the services ZENworks Configuration Management will deliver.
    - A detailed summary of your technical findings, and what needs to change in order to support ZENworks Configuration Management in the infrastructure. Suggestions should include best practices and detailed recommendations to resolve any known issues.
    - High-level design information, including general placement of services and other infrastructure components.
- **High-level graphical design diagram:** This diagram is used to visually understand what the infrastructure will look like after the deployment is complete. This is a foundational document, and it should be further refined during the design phase of your project.

Gathering Critical Information for Design Activities

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After you have created your high-level design, you need to gather additional information to help you design your specific implementation. Introducing Novell ZENworks Configuration Management into an environment involves the efforts, considerations, and input from multiple sources.

The following sections highlight the major areas of concern:

- Section 3.1, “Design Criteria/Decisions,” on page 19
- Section 3.2, “Scalability of the Primary Server,” on page 23
- Section 3.3, “Scalability of Satellite Devices,” on page 28
- Section 3.4, “Scalability, Fault Tolerance, Maintenance, and Sizing of the Database Server,” on page 32
- Section 3.5, “Virtualization Considerations,” on page 35
- Section 3.6, “Ports Used by ZENworks Components,” on page 36
- Section 3.7, “Network Considerations,” on page 38

3.1 Design Criteria/Decisions

A fundamental objective of a design is to balance the need for hardware while easing the load on the customer's network during deployments.

The following sections contain more information:

- Section 3.1.1, “Decisions to Make Before Installing the Primary Server,” on page 19
- Section 3.1.2, “Infrastructure Placement,” on page 22
- Section 3.1.3, “Infrastructure Scale Assumptions,” on page 23

3.1.1 Decisions to Make Before Installing the Primary Server

A number of decisions should be made before installing the first ZENworks Primary Server.

The following sections contain more information:

- “Required Functionality” on page 20
- “Certificate Authority” on page 20
- “Management Structure” on page 20
- “Application Store” on page 20
- “Staging and Grouping” on page 21

Required Functionality

Only the functionality that is needed by the customer should be enabled. Start with a simple approach, harden the implementation, and then expand it in the future. For example, if Patch Management, User Sources, and BOE Reporting are not required by the customer, do not enable or install them.

Certificate Authority

ZENworks Configuration Management provides the choice of using an external Certificate Authority (CA) or an internal ZENworks CA. The ZENworks CA is created during the installation of the first ZENworks Primary Server and is used throughout the life of that ZENworks Management Zone. The current lifespan of the internal certificate is ten years.

As each subsequent Primary Server is installed, its certificate is signed by the CA. The certificate is distributed to all managed devices as part of the ZENworks Adaptive Agent installation. This lets each Adaptive Agent connect to any Primary Server because each server’s certificate is signed by the trusted CA.

Currently, there is no easy automated method for changing the CA. To change it, each server's certificate must be re-minted and the certificate of the new CA must be delivered to all managed devices. For this reason, the decision to use an external CA must be considered very carefully. Certificates provided by VeriSign usually expire after one or two years. If you use these certificates, ZENworks Configuration Management loses all functionality on the expiration date because ZENworks Adaptive Agents cannot check into the ZENworks Management Zone.

Management Structure

With the previous generation of ZENworks, the technology was tied closely to Novell eDirectory. In traditional NetWare or eDirectory file and print environments, ZENworks is structured according to the design of eDirectory and was therefore based on geography. However, geography is no longer a requirement for the structure of folders in the Management Zone. Because devices can connect to any Primary Server, and all Primary Servers should be linked over fast links, the structure of management can be based on other criteria.

Customers might want to base the folder structures for devices on business functions, such as Human Resources, Finance, Sales, and so forth.

Basing the device folder structure on geography is still possible and might be required by many customers. Some customers might want to implement policies and applications site by site, room by room, and so forth.

Application Store

Traditional ZENworks implementations require file repositories to store application content. Users and devices access this content via mapped network drives or directly via UNC paths defined in the application object. Although this fits well with a traditional file and print model, it has the following drawbacks:

- **Synchronization:** If an application is to be made available to all users, the source content must be copied to all servers. This requires additional products and processes to be introduced to manage the location of content, such as the Tiered Electronic Distribution component of ZENworks Server Management.

Rights: When files are stored in a traditional file and print model, the rights to these locations must be managed carefully. If users roam between sites, they might need access to all application repositories to ensure that applications can be installed and verified at any location.

With ZENworks Configuration Management, bundles can be created to install applications from mapped network drives and UNC paths as before. If you used mapped drives and UNC paths, file synchronization and the rights to those files must be managed outside of ZENworks Configuration Management.

ZENworks Configuration Management also allows for application content to be injected in to the ZENworks Content Repository. By default, the Content Repository is synchronized between all Primary Servers and is downloaded by devices using HTTP. You can, however, specify which Primary Servers host content (at least one Primary Server must host the content).

Using the ZENworks Content Repository has the following advantages:

- **Synchronization:** Content is automatically synchronized to other Primary Servers and Satellite devices. This allows devices to download content from the most appropriate location.
- **Rights:** Rights to files do not need to be managed. Only device and users who are assigned to the content in ZENworks Configuration Management have access to that content. If a user accesses a ZENworks Content Repository, the content files are encrypted and cannot be used. In a traditional model, a user with read access to an application store has the ability to manually install any application that resides there.
- **Content is firewall and location friendly:** Files are delivered encrypted over HTTP. This means that there is no need for the user to have the correct drive mapping with the necessary rights. If the user has been assigned the content, it is downloaded via HTTP from the most suitable location.

Downsides to using the Content Repository include the following:

- **Disk Space:** Additional disk space is required. Many customers have extremely large application repositories distributed over many servers. These repositories must be re-created in ZENworks Configuration Management. If a customer has a 100 GB application repository, ZENworks Configuration Management requires at least 100 GB on each Primary Server to store applications, in additional to the space needed for other content, such as patches and system updates.
- **MSI applications cannot be easily changed:** After an MSI application is uploaded to the Content Repository, it cannot be changed. To make changes, the original MSI must be updated and then re-injected back into the Content Repository. In this scenario, a master store of all applications must reside outside of ZENworks Configuration Management to allow for edits.

Staging and Grouping

Grouping devices is very important in ZENworks Configuration Management because it allows applications, policies, and system updates to be deployed in a staged fashion.

We recommend that the following groups are identified in your customer environment:

- **Test devices:** Identify test devices that are first to receive updates. Ensure that build versions are represented for each operating system in the field.
- **IT departments:** Identify IT staff that are typically the first users to receive live updates and applications.

- **Early adopters:** Identify early adopters who will test deployment in each business unit and geographical location.
- **Home workers/VPN users:** Identify home workers or users who use a VPN so they can help test deployment via DMZ and VPN connections.
- **VIP users:** Identify important users whose devices require special focus and attention. You might want to transition executive laptops and workstations at the end of deployment.
- **General population:** Create logical groups for the rest of managed devices, based on business function or geography.

3.1.2 Infrastructure Placement

In order to calculate what infrastructure is required and where it should be located, you need to plan for the scalability of ZENworks Configuration Management.

NOTE: At the time of writing this document, the SuperLab facility in Provo, Utah has provided metrics and results, as seen in various places in this section, that give you a better understanding about how the individual components scale. These figures will be kept up-to-date as this document continues to grow over time.

Based on the connection information, the number of ZENworks Primary Servers and Satellite devices needed to support thousands of devices can be calculated with the following rules in mind:

- "Primary Servers" on page 22
- "Satellite Devices" on page 22

Primary Servers

Each Primary Server must be connected to every other Primary Server, the database, and the user source by LAN speed or close links. Placing Primary Servers behind strong links allows for content synchronization, credential verification from the user source, and access to the ZENworks Configuration Management Database Server to occur quickly and efficiently. Performance suffers, including response times when using ZENworks Control Center to perform administrative tasks, if there are any barriers between Primary Servers and the Database Server,.

Satellite Devices

When configuring satellite devices, consider the following:

- Currently, Satellite devices are primarily designed to reduce load on the network, not to reduce load on the Primary Servers.

  Consider a scenario in which a Primary Server is located at Site1 and 10 managed devices are located at Site2. Site1 is connected to Site2 over a WAN or slow link. The managed devices are on a LAN or high-speed link. If you do not choose to configure a Satellite at Site2, then each managed device must traverse the network to get content from the Primary Server. If you choose to configure a Satellite at Site2, then only the Satellite would traverse the network to get content from the Primary Server, and all the managed devices would get the content that is locally available at the Satellite.

- Bandwidth calculations are based on ZENworks Configuration Management having access to a known percentage of the total bandwidth for a given link.
- Satellite devices should be located at remote sites to provide content local to devices on the local network.

3.1.3 Infrastructure Scale Assumptions

The following scale assumptions should be made when building the design of the infrastructure. These actual scale assumptions might be different, based on the services you are providing and how you break up the services across multiple servers.

- **ZENworks Primary Server:** A single ZENworks Primary Server can provide all ZENworks services (content, collection, and configuration) for as many as 3,000 devices in a ZENworks Management Zone.

  This is based on a Primary Server handling approximately 1,000 concurrent connections for all service types (content, configuration, and content).

  This is not real-world; see Section 3.2, “Scalability of the Primary Server,” on page 23 for additional details on how these figures can change, and what you need to consider to ensure that you are scaling to meet the needs of the organization.
- **Server-grade Satellite device:** A single ZENworks Satellite (dedicated server) can provide content services for as many as 1,000 concurrent devices.

  This is not real-world; see Section 3.3, “Scalability of Satellite Devices,” on page 28 for additional details on how these figures can change, and what you need to consider to ensure that you are scaling to meet the needs of the organization.
- **Workstation-grade Satellite device:** A single ZENworks Satellite (dedicated workstation) can provide content services for as many as 250 concurrent devices.

  This is not real-world; see Section 3.3, “Scalability of Satellite Devices,” on page 28 for additional details on how these figures can change, and what you need to consider to ensure that you are scaling to meet the needs of the organization.

3.2 Scalability of the Primary Server

Understanding the scalability of the individual components that make up the ZENworks infrastructure is of the greatest importance. You need to understand the limitations and where you can expect to see performance degradation to ensure that you build an infrastructure that can perform well, regardless of the load that your end-user community places on it.

The first area that you need to consider is the scalability of the Primary Server. It is important to design your Primary Server placement based on the information you collected during your assessment phase and what you anticipate your overall design will require. You should design your infrastructure so that there are always Primary Servers available to service devices and the administrators that are managing the system.

The following sections contain more information:

- Section 3.2.1, “Factors Influencing Scalability,” on page 24
- Section 3.2.2, “Load Testing in the Novell SuperLab,” on page 24
- Section 3.2.3, “Achieving Scalability in the Real World,” on page 27

3.2.1 Factors Influencing Scalability

The main physical factors that govern the scalability of the Primary Servers are:

- **RAM:** The majority of operations are performed by two services: zenserver and zenloader. Each of these services can consume approximately 1.2 GB of RAM.
- **Disk I/O:** Disk I/O is used when serving content for applications and updates.

The minimum hardware recommendations are listed in "Primary Server Requirements" in the *ZENworks 10 Configuration Management Installation Guide*. If you can provide hardware that exceeds these recommendations, your system will perform better. Adding more RAM, however, does not make the specific ZENworks services (zenserver and zenloader) respond more quickly. This is a Java related issue and will be resolved in the future by moving from a 32-bit JVM to 64-bit JVM. If possible, we recommend that you use a 64-bit OS, so that you are ready when this change is made. Additional processing power and faster drives can make the systems more responsive, for example:

- Using a quad core processor
- Using 4 GB RAM
- Allocating as much disk space as you can (RAID 5 with separate physical drives to separate content and ZENworks Configuration Management from the OS)

There are other factors that you need to consider, including:

- Device refresh frequency
- Number of Primary Servers being used to deliver content to the managed devices (software, policies, images, patches, inventory collection, and so forth)
- Number of administrators who have access to ZENworks Control Center
- Frequency of uploading content in the ZENworks Content Repository
- Number and frequency of reports run by administrators

3.2.2 Load Testing in the Novell SuperLab

ZENworks Configuration Management is tested in the Novell SuperLab in Provo, Utah to see how much load can be placed on the individual components, and more importantly, where the individual components start to break down and when performance is dramatically affected.

These tests provide insight on how far you can stretch the infrastructure design (for example, how many Primary Servers you need, based on the components and services you plan to deliver).

The following three tests show how Primary Servers react under different loads, and how quickly they can service individual requests when load is increased.

The test included the following hardware and software:

- A Dell 2950 Dual Quad Core 2.0Ghz, 4 GB RAM, RAID 5 (4 X 300 GB) server was used for the Primary Server.
- Windows Server 2003 Enterprise on a 64-bit device.
- ZENworks Configuration Management shipping code.
  - Deploying 100 MB of bundles (11 bundles) to an increasing number of devices.

- All ZENworks Control Center settings used the default; after the 500-device test, retries were boosted to 800/10/20.
  - Three test passes for each test were run (for example, three test runs with 250 devices).
  - All devices were refreshed “simultaneously” (within 30 seconds).
  - The bundles were chained with the first bundle being associated to a device group set to launch on refresh.
- All tests were run on a full gigabit network.

The following sections contain more information:

- “Test 1: Average Time to Refresh” on page 25
- “Test 2: Average Time to Download” on page 26
- “Test 3: Administrative Tasks Performed Under Load” on page 26

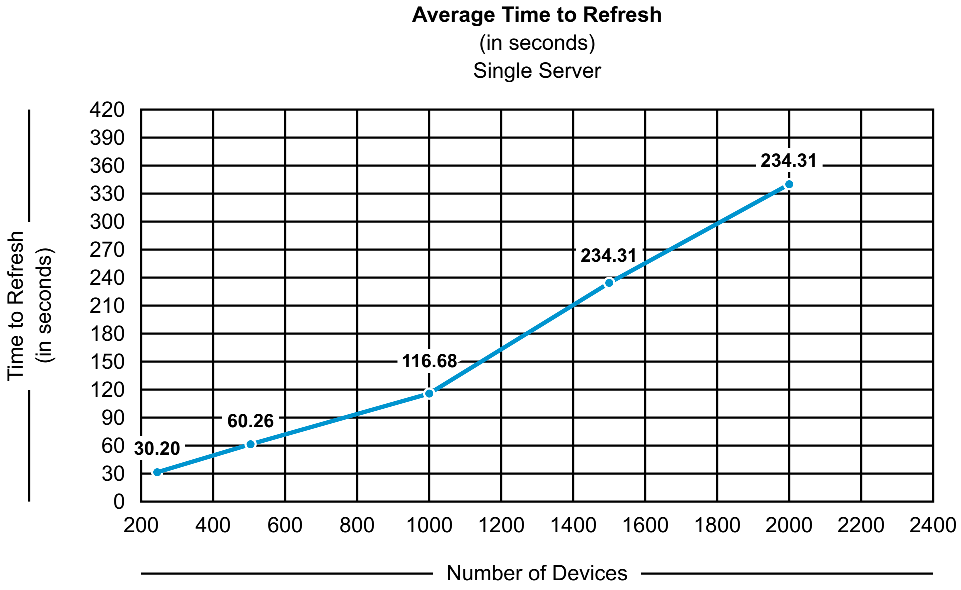
Test 1: Average Time to Refresh

In this test, we used a single ZENworks Primary Server and refreshed all machines inside the lab at the same time. The devices then contacted the Primary Server at approximately the same time. We calculated the amount of time it took for the refresh of the ZENworks Adaptive Agent to complete. As the load increased, the average time increased as well. In fact, the time to complete the refresh increased considerably at the 1,000 device mark. Between 1,000 and 2,000 devices, the amount of time it takes to complete the refresh more than doubled.

The Primary Server scaled well to this point; however, this does not mean that you should implement a single Primary Server to manage 3,000 managed devices. You must always consider the services that are being implemented, and most importantly, fault tolerance and load balancing.

The following graphic shows the average time to refresh managed devices:

Figure 3-1 *Average Time to Refresh*

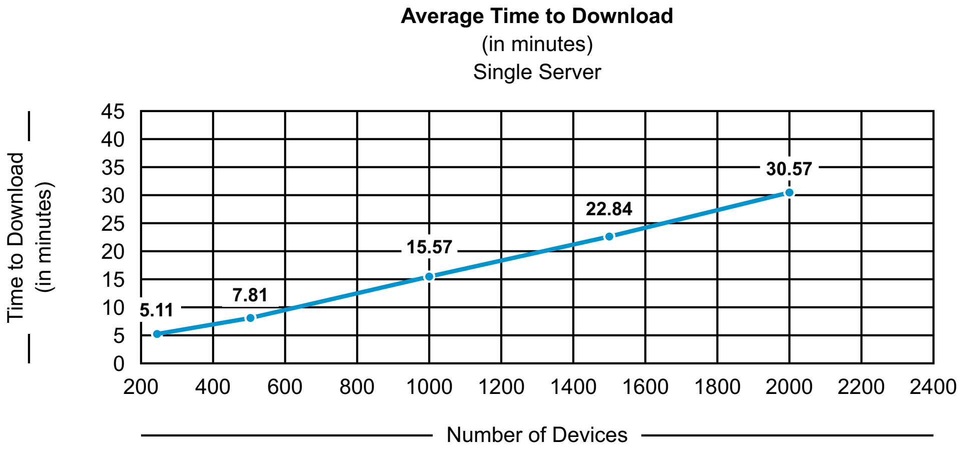


Test 2: Average Time to Download

This test demonstrates the results of a download of 100 MB of bundle content, spread across 11 bundles that are chained together. The server load increased as the load (in terms of devices) increased.

The following graphic shows the number of minutes it took to download the content:

Figure 3-2 Average Time to Download



Test 3: Administrative Tasks Performed Under Load

This test used a series of administrative tasks performed on a server with no load and then with a load. These results demonstrate what to expect in a given environment when a certain load is placed on a Primary Server that is multi-tasking. This test provides insight into what you can expect if you do not properly distribute services across multiple Primary Servers. These are conditions that should not exist in a real-world environment; Novell runs these tests to see when the processes begin to break. A well-designed infrastructure should perform well for you regardless of the load you are placing on the servers.

The load consisted of 480 devices running the Daily Use Test.

The Daily Use Test environment in the Super Lab consisted of the following:

- Single Server: Windows Server 2003 x86_64
- Server hardware: Dell 2950, Quad Core 2.0 MHz, 8 GB RAM
- External Microsoft SQL Server 2005 database

Definition of the “Daily Use” included the following:

- 24-hour period simulated in four hours
- Three bundle pushes of 105 chained bundles (30 MB to 1 KB) per device
- One full and three delta inventory scans per device
- One patch distribution per device
- Four device refreshes per device
- Ten devices continually restoring images

This test environment stretched the limits of what the ZENworks Configuration Management system is able to achieve, giving us a good idea of where the system starts to reach its limitations. It comes close to a real-world simulation.

Table 3-1 *Tests and results.*

Test Name	Test Description	Primary Server Under No Load	Primary Server Under Load
BOE Report	Run Predefined BOE report - Bundle Deployment Status (313 pages)	15 seconds	18 seconds
Inventory Report	Run canned report “Devices By Machine / Login Name”	7 seconds	8 seconds
Policy	Create policy, assign it to 60 devices, and perform a quicktask on all 60 devices to get the policy	7 minutes 43 seconds	7 minutes 45 seconds
Multicast	Create Multicast bundle and multicast to 60 devices	4 minutes 20 seconds	4 minutes 27 seconds
Bundle	Create an MSI Bundle of OpenOffice, assign it to 60 devices, and refresh all 60 by using a quicktask	25 minutes 30 seconds	1 hour 10 minutes 17 seconds

When the server is under load, and we created an MSI bundle and assigned it to 60 devices, there is a large increase in the amount of time it takes to complete the task. In this situation, it is recommended that you have a dedicated server for ZENworks Control Center so that there would be virtually no impact on performance.

The ZENworks Control Center is used by administrators to perform administrative tasks, including the management of content within the system. For environments that are managed by a small number of administrators (one or two), accessing ZENworks Control Center from a Primary Server that is also performing work might not be cause performance issue. For larger implementations (several thousand devices, large amounts of daily content activity, and several administrators), having a dedicated Primary Server in place for ZENworks Control Center resolves potential performance issues.

3.2.3 Achieving Scalability in the Real World

Section 3.2.2, “Load Testing in the Novell SuperLab,” on page 24 discussed testing in the Novell SuperLab to determine the limits of the ZENworks system. Scalability, on the other hand, is achieved through the proper placement of services, a well thought-out design, and the proper configuration of services within the ZENworks Configuration Management system itself.

For example, even though we know that a Primary Server can manage 3,000 devices, you should never deploy only one Primary Server in a 3,000-device environment. For this situation, we recommend the following as a starting point:

- Three Primary Servers to manage load and build a system that is fault tolerant.
- A dedicated Database Server using Sybase, Oracle, or Microsoft SQL Server.

This system should be further enhanced by considering the following:

- Using an L4 switch to manage fault tolerance and load balancing.
- Using DNS and aliases for managing the load placed on Primary Servers during deployment and registration.
- Using custom Closest Server Rules to designate certain servers for specific functions (content, collection, etc.) and to exclude servers from specific functions, or all functions. If a Primary Server is not listed in the Closest Server Rules, then it does not perform the functions.
- Using a dedicated Primary Server for reporting.
- Using a dedicated Primary Server for Patch Management.
- Using a dedicated Primary Server for imaging.
- Using a dedicated Primary Server for ZENworks Control Center.
- Using Satellite devices for distribution of content.

The Primary Servers are the heart of your ZENworks Configuration Management environment. You want to protect these systems from major disruption. Primary Servers can be used for distribution of content, but this needs to be factored in to your design.

Some of the major factors that you need to consider with ZENworks Configuration Management and Primary Servers are the following:

- Each Primary Server can comfortably handle 1,000 concurrent connections.
- Each Primary Server can manage 3,000 devices that are registered into the ZENworks Management Zone.
- A ZENworks Management Zone can scale to 40,000 devices. This has been validated in the SuperLab and is what Novell recommends as the upper limit to the Management Zone size.

We also recommend that Primary Servers and the Database Server be on the same network, in the same data center. We do not recommend spanning WAN links with Primary Servers because replication of the Content Repository could cause utilization issues. Placement of services in a multi-site environment is done by utilizing the Satellite role, which is discussed in more detail in the next section.

3.3 Scalability of Satellite Devices

The second area that you should carefully consider is the scalability of the Satellite devices. Satellite devices are designed to reduce load on the network, not to reduce load on the Primary servers. Satellite devices help reduce redundant traffic, load, and utilization from the WAN. Even if devices are located at a remote site, they connect to the central site for authentication and checking in with the Primary Servers to see if there is work to do. The actual work should be performed with remote Satellite devices strategically placed to service work requests from managed devices.

The following sections contain more information:

- Section 3.3.1, "Factors Influencing Scalability," on page 29
- Section 3.3.2, "Load Testing in the Novell SuperLab," on page 29
- Section 3.3.3, "Achieving Scalability in the Real World," on page 31

3.3.1 Factors Influencing Scalability

The major factors influencing scalability of Satellite devices include:

- Disk I/O and the requests that the Satellite device is concurrently managing
- Size of the subnets and their respective network speed
- Services the Satellite device is performing (imaging, inventory collection, and distribution)
- Disk capacity (the Satellite device must have enough capacity to cope with the required content)
- Physical memory (RAM) installed on the Satellite device
- The number of managed devices the Satellite device is managing
- The frequency of distributions and the number of concurrent connections
- Whether inventory collection or software distributions are randomized
- Whether an L4 switch fronts the Satellite devices at a particular location
- Whether Satellite device groups are used
- Class of hardware (server-class hardware performs better than workstation-class hardware)
- Class of operating system (a Satellite device running on Windows Server can handle more requests and workload than a Satellite device running on Windows XP or Windows Vista)

Keeping these factors in mind, you should build your design to manage the known devices and estimated ongoing workload.

3.3.2 Load Testing in the Novell SuperLab

Novell performed Satellite device scale tests using both server-class and workstation-class operating systems. As with testing that was performed on the Primary Server, the purpose of the tests was to find the point where the systems began to reach their limits. This gives us an understanding of scale under severe load.

The tests included the following:

- **Server-class Satellite devices:** Dell PowerEdge 2950, Dual Quad Core 2.0Ghz, 8 GB RAM, 2 X 300 GB SAS hard drives running Windows 2003 Enterprise.
- **Workstation-class Satellite devices:** White box, AMD 3400+, 2 GB RAM, 80 GB SATA hard drive running Windows XP SP3.

The Novell Corporate Configurations Test (CCT) team, using the baseline test of 250 bundles (1 KB file bundles), had the following results:

- A server operating system (Windows 2003 Enterprise) machine can scale to 1,000 managed devices.
- A workstation operating system (Windows XP SP3) machine can scale to 250 managed devices.

The following sections contain information about three tests performed in the SuperLab with Satellite devices:

- "Test 1: Bundle Size" on page 30
- "Test 2: Server OS Delivering Multiple Chained Bundles" on page 31
- "Test 3: Workstation OS Delivering Multiple Chained Bundles" on page 31

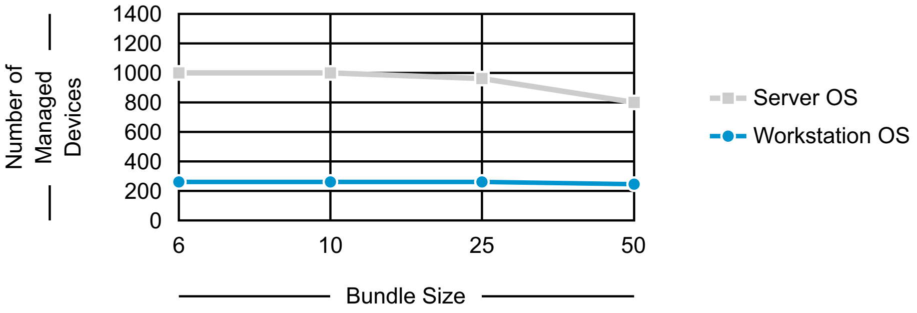
Test 1: Bundle Size

Test results show how large a single bundle can be to be distributed by a Satellite device to managed devices. These results are useful when you begin to estimate how many Satellite devices are required based on the ongoing estimated load. You need to calculate estimated load during the design phase as you work with the different groups that manage processes around software distribution, patch distribution, inventory collection, and image distribution. You need to know how frequently these processes are required, and the estimated size of the typical distribution or collection.

Bundle Size (MB)	Server OS	Server OS	Workstation OS	Workstation OS
	Number of Managed Devices in Test	Number of Managed Devices Successful	Number of Managed Devices in Test	Number of Managed Devices Successful
6	1004	1004	259	259
10	1004	1004	259	259
25	1004	968	259	259
50	1004	801	259	248

The following graph shows what you can expect in terms of Satellite device scalability given the conditions of the test:

Figure 3-3 *Bundle size.*



The graph illustrates the probable scalability limitations of the Satellite device. Under normal load, and through the use of proper configuration parameters (for example, randomizing distributions and collections) we can comfortably conclude that a Satellite device running on server-class hardware and Windows Server can scale to approximately 1,000 managed devices, and a Satellite device running on workstation-class hardware and Windows XP or Vista can scale to approximately 250 managed devices.

Test 2: Server OS Delivering Multiple Chained Bundles

This test shows the results of a Satellite device running on a server OS delivering multiple chained bundles to connected managed devices. This information is useful when calculating how much load you can place on the Satellite device running on a Server OS when deploying applications that are chained. This obviously can differ greatly from deploying single bundles.

Number of Bundles	Bundle Sizes in MB	Total Number of Managed Devices	Number of Devices Successful Managed
5	10, 15, 20, 25, 30	999	996
4	5, 10, 15, 20	999	996

Test 3: Workstation OS Delivering Multiple Chained Bundles

This test shows the results of a Satellite device running on a workstation OS delivering multiple chained bundles to connected managed devices. This information is useful when calculating how much load you can place on the Satellite device on a workstation OS when deploying applications that are chained together. This obviously can differ greatly from deploying single bundles.

Number of Bundles	Bundle Sizes in MB	Total number of Managed Devices	Number of Devices Successfully Managed
5	10, 15, 20, 25, 30	259	259
4	5, 10, 15, 20	259	259

3.3.3 Achieving Scalability in the Real World

The testing in the SuperLab tests the upper limits of a Satellite device. It is important to note that if you are deploying a bundle that is less than 25 MB in size, we see successful distributions to both 250 and 1,000 managed devices from workstation-class and server-class Satellite devices. With this as a known, we can safely assume that by doing the following, you can achieve these levels of scalability, and quite possibly much more:

- For larger sites (more than 250 managed device):
    - Have a dedicated Satellite device for imaging purposes.
    - Have a dedicated Satellite device for inventory collection if the collection frequency is high. In other words, if you are collecting daily, you want the server to be dedicated, but if you are collecting monthly, you can collapse this service into another Satellite device onsite.

  - Have a dedicated set of Satellite devices for software and patch distributions if the frequency of distributions is high. You want to randomize the distribution of software and avoid massive numbers of devices hitting the Satellite device at the same time.
  - Randomize the refreshes of managed devices at the site with Satellite devices.
- For smaller sites (fewer than 250 devices):
  - Have multiple Satellite device that share load and responsibility.
  - Do not be significantly concerned about designating specific servers for specific functions.
  - Randomize the refreshes of managed devices at the site with Satellite devices.

3.4 Scalability, Fault Tolerance, Maintenance, and Sizing of the Database Server

The primary considerations about database scalability include:

- How many devices are you managing? If you need to scale more than 1,500 devices, you might want to consider putting the database in either Oracle or Microsoft SQL Server.
- Can you leverage clustering technologies to achieve fault tolerance for the database? This ensures that the database is always available.

The following table lists the number of devices different databases can handle in a production environment:

Table 3-2 *Database Platform and Supported Number of Devices*

Database Platform	Number of devices
Sybase (embedded)	As many as 1,000
Sybase (remote)	As many as 1,500
Microsoft SQL Server 2005	1,500 to 40,000
Oracle 10g	1,500 to 40,000

Ensure that you use the vendor database backup tools to regularly back up the database. This ensures that if the database is lost, you can restore from a backup and get back to operations quickly.

The following sections highlight recommended best practices when managing and maintaining your Database Server:

- Section 3.4.1, “Sybase,” on page 33
- Section 3.4.2, “Microsoft SQL Server,” on page 33
- Section 3.4.3, “Oracle,” on page 34
- Section 3.4.4, “Database Sizing and Performance Considerations,” on page 35

3.4.1 Sybase

One of the most important aspects of Sybase database maintenance is regular backups of the database files. You can use zman commands to back up the Sybase database. For more information, see “Database Commands” in the *ZENworks 10 Configuration Management Command Line Utilities Reference*.

3.4.2 Microsoft SQL Server

The most important aspects of managing and maintaining a Database Server that is hosted on a Microsoft SQL Server are the following:

- The customer must have the skills in-house, or readily available (contractor, consultant, or partner) to manage and maintain the Microsoft SQL Server based on the best practices that Microsoft outlines for regular database management.
- There must be regular database backup routines in place. This should also be documented in the design document.
- There must be regular database maintenance routines in place. This should also be documented in the design document.
- Considerations for clustering (high availability) of the Database Server should be made and documented.

Microsoft SQL Server 2005 has a Maintenance Plan Wizard in the SQL Server Management Studio. This tool should be readily available to any customer that is utilizing Microsoft SQL Server in their data centers.

Maintenance tasks that can be scheduled include the following:

- Check database integrity
- Shrink database
- Reorganize index
- Rebuild index
- Update statistics
- Back up database

These tasks should be thoroughly understood before performing them on a live system that is hosting the ZENworks Configuration Management database.

Microsoft recommends the following when managing Microsoft SQL Server 2005:

- Backups should be performed daily.
- A Database Integrity Check should be performed every 14 days.
- Reorganizing or rebuilding indexes should be done when fragmentation is excessive. If fragmentation is greater than 30 percent, an index should be rebuilt. To determine the fragmentation of the indexes in your database, use the dynamic memory view 'sys.dm_db_index_physical_stats'. Novell recommends that rebuilding indexes should be done at least once per week because the clustered indexes will be fragmented over 75 percent within a few days of insert/update activity. This scenario is a contributing factor to lag, escalating locks, and eventual deadlocks.

A good overview of the Maintenance Plan Wizard can be found on the MSSQLTips Web site (http://www.mssqltips.com/tip.asp?tip=1127).

Microsoft also offers the SQL Server 2005 Best Practices Analyzer Tool. This tool addresses a wide variety of best practices as outlined by Microsoft. This tool can be found on the Microsoft TechNet Web site (http://www.microsoft.com/downloads/details.aspx?FamilyId=DA0531E4-E94C-4991-82FA-F0E3FBD05E63&displaylang=en).

Here are two examples we have seen reported on a ZENworks Configuration Management installation on SQL Server 2005:

- Place data and log files on separate drives for database [zenworks_database] on server [server_name]
- Check database integrity at least every 14 days for database [zenworks_database] on server [server_name]

The Best Practices Analyzer tool also indicates that log files and data files should be placed on separate hard drives to improve I/O, thus improving overall performance of the Database Server. However, this can be a problem if the database files are hosted on a SAN or inside virtual machines, which are both trends in the industry. This should also be well documented in the design document created during the design phase.

The Microsoft SQL Server Tuning Wizard makes suggestions about indexes you might want to add to the database. However, it uses the term “missing indexes,” which is misleading to anyone who might interpret this as a mandate. Each of these suggestions must be analyzed, balancing the performance trade-offs between inserting or updating data in a given table versus the variety of queries that might be made against a table. Indexes slow inserts and updates, while benefiting specific queries. There are a number of ways this analysis can be performed; the tuning wizard is just a first step. You should use SQL tracing tools and analyze the SQL demands that ZENworks Configuration Management is making on the database while it performs various functions, such as registration, bundle creation and deployment, policy enforcement, inventory, and so forth. After you have accurate information on what kind of load ZENworks Configuration Management is placing on the database, you can then add your indexes.

3.4.3 Oracle

For performance and maintenance suggestions in an environment where Oracle is the Database Server hosting the ZENworks Configuration Management database, you must rely on the knowledge and expertise of the Oracle database administrator at the customer site. The individuals responsible for the day-to-day management of the Oracle infrastructure must be involved in the ZENworks Configuration Management deployment project from the beginning.

However, you should familiarize yourself with some of the administrative concepts about Oracle database management. The Oracle Database Documentation Web site (http://www.oracle.com/technology/documentation/database10g.html) contains information about Oracle 10g and should be used as a reference.

In addition, you should also familiarize yourself with some of the performance tuning concepts for an Oracle Database Server, especially the reference documentation on the SQL Performance Analyzer. This information is available in the *Oracle Database Performance Tuning Guide* (http://download.oracle.com/docs/cd/B19306_01/server.102/b14211/toc.htm).

Best practice information suggested by Oracle regarding backup and recovery can be found on the Oracle Web site (http://download.oracle.com/docs/cd/B19306_01/server.102/b14220/backrec.htm#CNCPT031). The onsite Oracle database administrators should be familiar with these concepts and procedures. They simply need to know what additional information they need to back up as a result of the implementation of ZENworks Configuration Management.

3.4.4 Database Sizing and Performance Considerations

As a general rule of thumb, Novell has seen that the database size increases at a rate of approximately 1 GB per one thousand (1,000) devices in the Management Zone.

However, this is not the only consideration to make when designing the Database Server. Best practices for fault tolerance, maintenance, and performance need to be considered along with the general calculations for overall database size.

Most larger customers have Service Level Agreements that commit to minimal downtime and require robust storage capabilities. For sites with more than 10,000 devices, RAID (mirror with stripe) is recommended for the database, the transaction log, the TempDB, and the TempDB log. In fact, these four items need to be located on four separate LUNs (four separate disks or four separate logical arrays of disks). This addresses potential reliability issues.

Database Servers are very sensitive to disk performance. More smaller disks are always faster than fewer larger disks. This must be discussed while planning the database because a single 10 GB drive for a site with 10,000 devices might not perform adequately, although it might meet the database sizing formula. Ten smaller drives should perform much better.

Testing and monitoring are an essential part of database configuration. You must measure the throughput (MB/sec) that the application is demanding of the database, and size the disk array accordingly. In addition, the operating system and executables do not have high I/O requirements and can reside on a mirrored array (a single mirrored pair) to provide reliability with no added performance.

ZENworks Configuration Management requires a dedicated Database Server that is not shared with other database applications. This needs to be discussed during the design phase so that everyone involved in the project (especially the database administrator) is fully aware of the requirements. This might not be the case in very small implementations of ZENworks Configuration Management.

3.5 Virtualization Considerations

A major consideration for the design of the customer’s infrastructure is whether or not the customer is willing to virtualize some of the ZENworks Configuration Management infrastructure components. With version 10.2, the components are supported on both VMware and Xen. This could be an excellent low-cost alternative to hosting more ZENworks Configuration Management servers on fewer physical servers.

For example, if the customer is required to deploy three physical servers in the data center, it might be possible to increase this number to two or three hosted virtual servers on two physical servers. This would create additional fault tolerance and redundancy, as well as better performance across the board.

If the customer is considering running their ZENworks Configuration Management infrastructure on either SUSE Enterprise Server (SLES) or Windows Server, technologies such as the PlateSpin product set could also assist, including fault-tolerance capabilities provided by PlateSpin Forge, assessment capabilities provided by PowerRecon, and workload management capabilities provided by PowerConvert.

3.6 Ports Used by ZENworks Components

ZENworks Configuration Management uses a number of ports to communicate, based on specific functions and features. These ports must be considered when building the design of the infrastructure because they need to be open on firewalls if services reside behind them.

The following table outlines the ports that are used by ZENworks Configuration Management, and gives a description of what services use them, and why. This information should be shared early in the design phase, and should be reviewed by the network services teams.

Table 3-3 *ZENworks Configuration Management Ports*

Port	Description
HTTP (TCP 80) Stateful Primary Server and Satellite devices	Used to transmit content between the Primary Server or Satellite devices and managed devices. Primary Server downloads patch license related information and checksum data over HTTPS (port 443), and the actual patch content files over HTTP (port 80). ZENworks Patch Management license information is obtained from the Lumension licensing server (http://novell.patchlink.com), the patch content and checksum data is retrieved from an AKAMAI hosted content distribution network (novell.cdn.lumension.com). You must ensure that the firewall rules allow outbound connections to these addresses because the patch content distribution network is a large fault tolerant network of cache servers.
HTTPS (TCP 443) Stateful Open on the Primary Server	Used to transmit configuration metadata, authentication credentials, and tokens between the Primary Server and managed devices. Used for Tomcat secure port. It is also used by default to download system updates from NCC and to download Product Recognition Update (PRU). Primary Server downloads patch license related information and checksum data over HTTPS (port 443), and the actual patch content files over HTTP (port 80). ZENworks Patch Management license information is obtained from the Lumension licensing server (http://novell.patchlink.com), the patch content and checksum data is retrieved from an AKAMAI hosted content distribution network (novell.cdn.lumension.com). You must ensure that the firewall rules allow outbound connections to these addresses because the patch content distribution network is a large fault tolerant network of cache servers.

Port	Description
CASA (TCP 2645) Stateful Open on the Primary Server	Used to transmit authentication credentials and tokens between the Primary Server and managed devices when the Tomcat server listening on Port 443 is busy.
LDAP / LDAPS (TCP 389 / TCP 636) Stateful Open on the Directory Server	Used to transmit directory information between the Primary Server and Directory Server (Novell eDirectory or Microsoft Active Directory).
Sybase (TCP 2638) Stateful Open on the Database Server	Used for JDBC communication between Primary Servers and an internal or external Sybase database.
SQL (TCP 1433) Stateful Open on the Database Server	Used for JDBC communication between Primary Servers and an internal or external Microsoft SQL Server database.
Oracle (TCP 1521) Stateful Open on the Database Server	Used for JDBC communication between Primary Servers and an internal or external Oracle database.
Imaging (TCP 998) Stateful Open on the Primary Server and imaging Satellite devices	Used to transmit images and requests for work to do between the Primary Server and machines being imaged.
Proxy DHCP (UDP 67 / UDP 4011) Open on the Primary Server and imaging Satellite devices	Used to answer DHCP requests for PXE information. The standard DHCP port (67) is used if the server is not also a DHCP server; otherwise, the BINL port (4011) should be used.
TFTP (UDP 69) Open on the Primary Server and imaging Satellite devices	Used to send and receive TFTP data for PXE devices.
ZMGPreboot (UDP 13331) Open on Primary Server and imaging Satellite devices	Allows PXE devices to communicate with the PBServ service to determine work to do. Required because the TCP stack now exists in the PXE environment.
ZENworks VNC (5950) Open on the managed device	Allows remote control and other remote operations to be performed. Communication is between the managed device and the Administration Console.
ZENworks VNC Request (5550) Open on the Administration Console	Allows remote management requests to be sent by managed devices. Communication is between the Administration Console and the managed device.

Port	Description
Windows File and Print Sharing / CIFS (137-139)	Communication is between the Primary Server and the managed device or the WinProxy and the managed device. Open on devices you want to discover via WinAPI and on CIFS servers you want to store 3rd party images on
ICMP Open on devices you want to discover	Used to determine if a device exists on the network so that it can be further interrogated. Communication is between the Primary Server or WinProxy and the device you want to discover.
Agent Management Port (TCP 7628) Open on managed devices used to send quick tasks to the managed device	Communication is between the Primary Server and the Agent.
Wake-On-LAN Port (UDP 1761)	Used to forward subnet-oriented broadcast magic packets for Wake-On-LAN.
Remote Management Proxy Port (5750)	Used by the remote management proxy to listen for the incoming remote management requests from the remote management viewer.

A more comprehensive version of this table is found in Section D.4, “Extended Port Chart Including Port Usage,” on page 126.

3.7 Network Considerations

How network services are used plays a big role in the success of the overall deployment. Ensure that you understand this area very well and involve the right people in the project from the start.

Individuals and departments that you want to notify and involve include:

- **Network services:** The teams that manage the physical network infrastructure and hardware.
- **Security services:** The teams that manage the security aspects of the network infrastructure and services.
- **Operations:** The teams that manage the provisioning of services and resources to the devices that ZENworks Configuration Management will manage.

The following sections contain more information:

- Section 3.7.1, “Infrastructure vs. Bandwidth: Satellite Devices,” on page 38
- Section 3.7.2, “DNS and DHCP Services,” on page 41
- Section 3.7.3, “Time Synchronization,” on page 41
- Section 3.7.4, “Support for the NetWare Operating System,” on page 41

3.7.1 Infrastructure vs. Bandwidth: Satellite Devices

When considering the requirements for infrastructure, it is important to look at the available bandwidth for a workstation, in addition to the requirements of the management product. It might be necessary to update all devices as soon as possible.

By reducing the amount of infrastructure in place, ZENworks Configuration Management becomes more reliant on the available bandwidth to each device when deploying software.

To calculate the available bandwidth for a given site, a number of formulas can be used. The following examples indicate the amount of data that can be transmitted to a device within a given one-hour period. The formula assumes that a local Satellite device is not present. Therefore, all software downloads must be served by the WAN link to a Primary Server. Although these formula are not completely accurate, and are based on a number of assumptions, they can be used to indicate which sites are good candidates for a Satellite device. As a rule of thumb, most remote sites are good candidates for a Satellite device because your goal is to always deliver content and collect information from managed devices quickly and efficiently. Generally speaking, delivering content across a WAN infrastructure to multiple managed devices is not an efficient use of network resources.

The following formula defines how to calculate the maximum amount of data that can be transmitted to a device within a given one-hour period:

$$\frac{\left(\left(\frac{\text{Available Bandwith (Mbps)}}{8}\right) \text{ x } 3600\right)}{(\textit{Connected Devices})} = \textit{MB per device per hour}$$

The result of this formula provides information on the amount of data that can be transmitted to each device within a one-hour period.

Available bandwidth in this formula is not the total link speed. Other data is transmitted over the link within a given hour and must be taken into account, for example:

- Internet traffic
- File and print
- Directory authentication
- Line of Business applications
- VOIP

In the following examples, sites with different numbers of devices and link speeds are used to demonstrate the levels of bandwidth available to a device within a one-hour period.

Two sites have been chosen: SITE 1 (650 devices with a 100 MB link) and SITE 2 (20 devices with a 10 MB link). For the purposes of the calculation, the formula assumes that approximately 95 percent of the available bandwidth is being used by other applications.

Based on link speeds, number of devices, and assumed available bandwidth, the formula gives the following results for SITE1:

$$\frac{\left(\left(\frac{5\text{ Mbps}}{8}\right) \text{x } 3600\right)}{650} = 3.46\ \textit{MB per device per hour}$$

In a one-hour period, it is possible to transmit 3.46 MB to every device at SITE 1 if you use all of the bandwidth available to ZENworks Configuration Management. This site, because of its size and lack of bandwidth per device, should be considered as a candidate to host a Satellite device.

Based on link speeds, number of devices, and assumed available bandwidth, the formula gives the following results for SITE2:

$$\frac{\left(\left(\frac{0.5\text{ Mbps}}{8}\right) \text{x } 3600\right)}{20} = 11.25\ \textit{MB per device per hour}$$

In a one-hour period, it is possible to transmit 11.25 MB to every device at SITE 2 if you use all of the bandwidth available to ZENworks Configuration Management. In this situation, you might not choose to place a Satellite device at this site because the level of bandwidth per device is relatively high.

When you take this all into account, the main requirements for choosing which sites should host a Satellite device vary from one installation to the next. For example, some customers, even though the available bandwidth with SITE 2 is high, might still want to have a device locally designated as a Satellite device. In this case, a workstation-class machine should be more than sufficient to manage the devices at that site.

The suggested placement of Satellite devices should be based on simple rules. Some examples of sites that are good candidates for Satellite devices are as follows:

- Sites with more than 200 devices.
- Sites that have high cost or limited access links between the MD and Primary Servers.
- Sites where the bandwidth per device per hour is less than *x*. In the examples above, 5 MB was chosen because this is the average size of a patch.
- Sites that have secure locations to store devices. Customers might not want to place dedicated Satellite devices in locations where they cannot be secured. In other words, you want to avoid a situation where a user turns off the Satellite device or physically removes it from the network.
- Sites with limited or charged access to WAN Infastructure.

3.7.2 DNS and DHCP Services

You should ensure that your network environment is well designed for ZENworks Configuration Management. You need to ensure the following:

- DNS forward and reverse lookup is properly configured so that you can resolve servers by using their DNS names and IP addresses. VNC, for example, relies on the DNS infrastructure. For this reason, it is important that the DNS service is well designed and implemented. If it is not, the problem needs to be addressed during the design phase, properly documented, and resolved before deployment begins.
- We recommend that you register all of your managed devices in DNS, which makes it easy to resolve by name. This is possible only if Dynamic DNS is in place and properly configured.
- DHCP must be properly configured for imaging purposes, and your network team should work with you to ensure that you can image across multiple subnets if necessary.
- PXE must be enabled on your workstations if you choose to leverage the automated imaging functionalities.

3.7.3 Time Synchronization

Time synchronization is an important factor for a stable ZENworks Configuration Management design. Configuration items and deployment tasks, such as bundles, inventory uploads and access to user sources, rely on time stamps to ensure secure access to the relevant data. If servers and devices have different times, this can cause a number of communication issues with the Management Zone.

We recommend that all devices have their time synchronized. This includes Primary Servers, the ZENworks Database, and managed devices.

For eDirectory customers, we recommend pointing the ZENworks Configuration Management Servers to eDirectory Time Sources via NTP. All clients usually use the same time source via the Novell Client, so the system is synchronized. For all customers, we recommend that a single source be used for synchronization.

3.7.4 Support for the NetWare Operating System

The introduction of the new ZENworks Configuration Management architecture means discontinued support for the NetWare operating system for both the Primary Server and the Satellite devices.

Customers are encouraged to consider migrating to Open Enterprise Server (OES) Linux or to SUSE Linux Enterprise Server (SLES) 10, which are supported as hosted platforms for the ZENworks Configuration Management Server services. As part of the migration, consider the following options:

- Migrating existing NetWare servers to OES Linux.
    - Complete migration away from the NetWare kernel
    - Virtualized on Xen on top of OES Linux
- Running the ZENworks Configuration Management core Server services (Primary Server) on OES Linux

- Running the ZENworks Configuration Management core Server services (Primary Server) on SLES 10
- Running the ZENworks Configuration Management core Server services in a virtualized instance of either OES Linux, SLES 10, or Windows Server on top of OES Linux or SLES 10.

Refer to the design phase section of this guide for details on how to leverage an existing NetWare infrastructure for application deployment. Remember that by doing this you also require additional technologies and products, such as ZENworks Server Management.

Performing Design Activities

4

The design phase of any project is the most intensive part of any Novell ZENworks Configuration Management deployment or migration. This is where you conduct the most meetings, and identify granular details for the design document and the plan to get ZENworks Configuration Management successfully deployed across the infrastructure.

The design phase of the project is where you will spend the most time. Up to 80 percent of the project time is spent in this phase, so do not approach this lightly.

Success is the critical measure of all deployments. If the design is built correctly and is based on Novell best practices, the infrastructure should behave properly and you should see fewer performance issues. A good design should seldom, if ever, need to be changed. You want it to in place for years to come and simply extend upon it.

A combination of the business and technical assessments gives the design team the ability to forecast future needs so the design is based on what you foresee the company infrastructure is like in the future.

The following sections contain more information:

- Section 4.1, "Design Workshops," on page 43
- Section 4.2, "Developing a Detailed Design," on page 44
- Section 4.3, "Lab Testing and Validation," on page 84
- Section 4.4, "Documentation," on page 85

4.1 Design Workshops

Before you start the design phase and workshops, you must complete the assessment phase, in its entirety. This is covered in detail in Chapter 2, "Performing Pre-Design Activities," on page 13.

The first thing you must do during the design phase is to work with the teams across the organization to identify who is responsible for what, and identify how to structure the design teams and schedule the meetings to get everyone with a stake in the project in a room to flesh out the details of the design elements. Plan to break down the design into manageable chunks, then put it all together as you develop the detailed design document and infrastructure architecture diagrams.

Conducting design workshops is the best way to consider each of these individual elements of the overall design. A workshop is an informal gathering of all individuals that have a stake in the success of that particular element, where you use a detailed agenda to direct the discussion.

For example:

- How is a function currently performed?
- How will the function be performed after ZENworks Configuration Management has been fully deployed?
- How many locations does the organization have?
- How many users work at each location?
- How many devices are located at each location?

- Do users roam from site to site?
- Do devices roam from site to site?
- What components of ZENworks Configuration Management are required, such as Configuration Management, Asset Management, and Patch Management?
- Is the customer limited to the use of a specific database vendor (Microsoft SQL, Oracle, or Sybase)?
- How do devices connect internally and externally?
  - VPN?
  - Internet?
- Which platforms should be used for the ZENworks Configuration Management servers?
- Which workstation platforms are used by the organization?

Topics for design activities should include, but are not limited to, the following:

1. Infrastructure topics, including Management Zone configuration, user sources, role-based administrative accounts, folder structure, and placement of services. The overall infrastructure layout should be developed with the most senior members of the customer's IT departments.
2. Device discovery and agent deployment.
3. Migration tactics, if applicable.
4. Software packaging.
5. Software delivery.
6. Device and user policies.
7. Inventory gathering and reporting.
8. OS deployment, including consolidation of existing OS images (for example, Universal Imaging).
9. Remote control capabilities.
10. Database design, including maintenance, performance, scalability, fault tolerance, backup, and restore procedures.
11. Administrative roles, including individual roles required by the customer, and identifying who is required to have an assigned administrative account with what level of access.

It is important that everyone involved agrees on each of the individual design elements. If you do not have consensus, you will likely face deviation from the design in the future. The objective of this phase is to build a solid design for the overall infrastructure that is based on best practices outlined by Novell. Every intricacy of the design needs to be well documented because this will be a reference during the deployment and long after the deployment is completed.

4.2 Developing a Detailed Design

After you have held all of the necessary workshops, you must create a design document to detail your findings and what you have agreed upon.

The following sections contain information that should be addressed and documented in detail. These sections cover areas that Novell recommends as best practice when deploying ZENworks Configuration Management across the infrastructure.

- Section 4.2.1, “Device Folder and Group Structures,” on page 45
- Section 4.2.2, “User Sources,” on page 46
- Section 4.2.3, “Role-Based Administrative Accounts,” on page 47
- Section 4.2.4, “Configuration Settings for the Management Zone,” on page 48
- Section 4.2.5, “Device Discovery,” on page 58
- Section 4.2.6, “Adaptive Agent Deployment,” on page 60
- Section 4.2.7, “Registration Rules and Keys,” on page 61
- Section 4.2.8, “Remote Management,” on page 64
- Section 4.2.9, “Inventory,” on page 65
- Section 4.2.10, “Application Management,” on page 67
- Section 4.2.11, “Policy Management,” on page 72
- Section 4.2.12, “Imaging,” on page 74
- Section 4.2.13, “Configuring a Layer 4 Switch,” on page 74
- Section 4.2.14, “ZENworks Systems Update,” on page 76
- Section 4.2.15, “Content Management,” on page 76
- Section 4.2.16, “Offline Content Replication and Management,” on page 81
- Section 4.2.17, “Satellite Authentication Role,” on page 82

4.2.1 Device Folder and Group Structures

Using ZENworks Control Center, you can manage devices by performing tasks directly on individual device objects. However, this approach is not very efficient unless you have only a few devices to manage. To optimize management of a large number of devices, ZENworks Configuration Management lets you organize devices into folders and groups. You can then perform tasks on a folder or group to manage its devices.

You can create folders and groups at any time. However, the best practice is to create folders and groups before you register devices in your Management Zone. This allows you to use registration keys and rules to automatically add devices to the appropriate folders and groups when the devices register. Membership for dynamic groups is automatically updated based on the defined schedule.

The following information should be considered when designing folder structure and groups for a Management Zone:

- Do you need to implement site administrators and sub-administrators who have limited rights to the system or only to part of the Management Zone? For example, you might need a site administrator who is only responsible for a specific location.
- Do you need Help Desk users who are allowed to assign bundles and perform some remote management tasks, but not allowed to create or modify items such as bundles and polices?
- Do you need site-specific settings, such as inventory schedules or system variables?
- Do you need department-specific configuration, such as system variables to set working directories or host IDs?

The following graphic is an example of a company that is organized by country. Further organizational folders can be included under each of these country folders. You can be as granular as you want, and this is encouraged to implement specific levels of management.

4.2.2 User Sources

User-based management requires an authoritative source of user information to govern access privileges, permissions, and configurations. The new architecture allows you link to multiple user directories for this information, including your choice of Active Directory, eDirectory, or both.

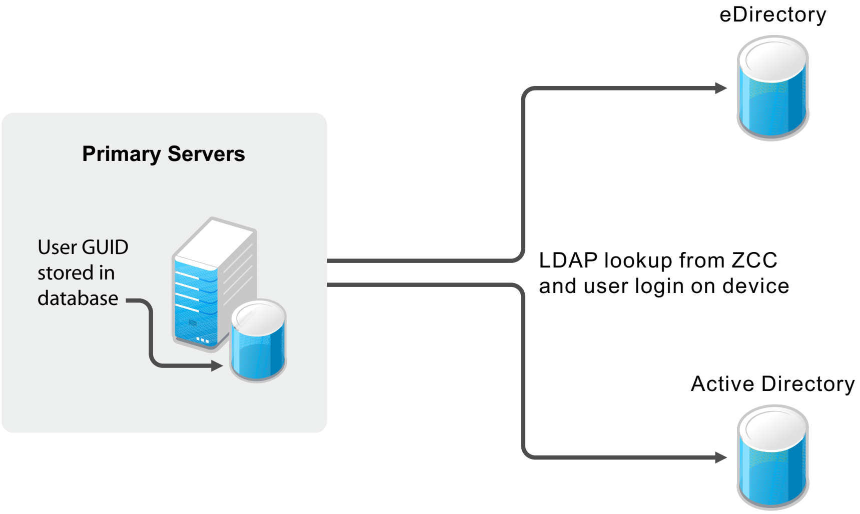
Linking system management with authoritative user directories ensures that new hires, terminations, internal moves, and other business changes immediately result in the appropriate provisioning, deprovisioning, reconfiguration, and other system management changes. Other systems typically require you to synchronize or copy Active Directory or eDirectory information to your management database, which increases the change management burden by requiring installation of additional software on the authoritative servers. If synchronization happens once a week, for example, users can wait for several days for the directory to be synchronized—or perhaps have several days when they can access resources they should not be able to use.

In ZENworks Configuration Management, all communication with authoritative sources is read-only, through LDAP. There is no need to extend schemas, so you avoid a potentially big change management issue. Also, there is no need to install new software or make any other changes to the user directories you currently use. Nor is there a need to install an intermediary identity management system between ZENworks Configuration Management and authoritative sources.

Primary servers can link directly to any number of authoritative sources, of any type, and user groups can span authoritative sources. This architecture allows simple management of resources through user, user group, and container assignments, without the limitation of a single authoritative source or the need to install and manage additional infrastructure to mediate between authoritative sources and ZENworks Configuration Management.

The following graphic illustrates how Primary Servers link to various user sources:

Figure 4-1 *Primary Server and User Sources*


eDirectory
Primary Servers
User GUID stored in database
LDAP lookup from ZCC and user login on device
Active Directory

As a best practice, you should set up your user sources prior to any deployment activities (discovery of devices and deployment of the ZENworks Adaptive Agent). You must understand your directory services infrastructure first, and the systems you will be referencing from your ZENworks Primary Servers. In addition, if your deployment is a migration from an existing ZENworks infrastructure (for example, ZENworks 7 Desktop Management), you must have your user sources defined prior to running any of the migration steps. If you do not do this, you will not be able to migrate user-based associations (including associations to user groups).

You can connect to Novell eDirectory and Microsoft Active Directory for your user sources. After you connect to either of these LDAP directories, you define the containers within the directory that you want exposed. Or, you could reference the top-level containers of the user source as the source or the containers that contain users. This limits access within the directory to only those containers that include users.

Both methods have some advantages and disadvantages that are mostly related to administration. There is no difference in assigning bundles or policies.

Selecting top-level containers ensures that all users in subcontainers and all containers added to the structure are maintained automatically and can be used for assignments without changes within ZENworks Configuration Management.

In addition, it is not possible to add subcontainers if the parent container is already in list. If you want to change the structure, you need to delete the parent container and you lose all assignments.

Because of this, we recommend that you use only containers where users reside. This means adding multiple sublevel folders from an eDirectory or Active Directory rather than only one.

4.2.3 Role-Based Administrative Accounts

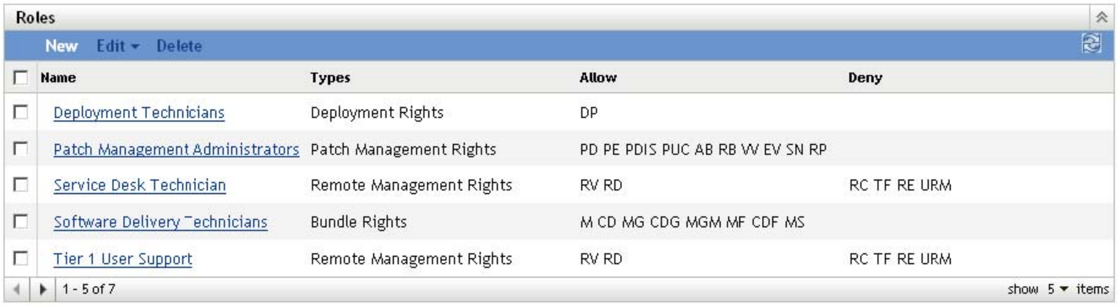
The roles feature allows you to specify rights that can be assigned as roles for ZENworks administrators. You can create a specialized role, then assign administrators to that role to allow or deny them the ZENworks Control Center rights that you specify for that role. For example, you could create a Help Desk role with the ZENworks Control Center rights that you want help desk operators to have. You can also create individual administrative accounts and assign these to managers of the system.

Common roles in most installations of ZENworks Configuration Management include the following:

- **Help Desk:** The Help Desk role should include common tasks, such as remote control, remote view, and so forth, and be bound to specific boundaries (device folders), especially where there are multiple sites and administration is not centralized.
- **Application Management:** The Application Management role should include tasks and functions for creating bundle content in specific folders and restricting it to folder boundaries. Some administrators require more rights than others, so multiple roles could be created.
- **Backup Administrator:** The Backup Administrator role is used if the default administrator account can no longer be used.
- **Individual Administrator Accounts:** It is also a best practice to create different levels of administrator accounts and assign these separately to individuals. Do not give the administrator credentials (the default Administrator account set up during the initial installation) to everyone.

The following graphic is an example of the kinds of roles you should consider when implementing ZENworks Configuration Management:

Figure 4-2 Roles Section in ZENworks Control Center



□	Name	Types	Allow	Deny
□	Deployment Technicians	Deployment Rights	DP	
□	Patch Management Administrators	Patch Management Rights	PD PE PDIS PUC AB RB VV EV SN RP	
□	Service Desk Technician	Remote Management Rights	RV RD	RC TF RE URM
□	Software Delivery ¯echnicians	Bundle Rights	M CD MG CDG MGM MF CDF MS	
□	Tier 1 User Support	Remote Management Rights	RV RD	RC TF RE URM

4.2.4 Configuration Settings for the Management Zone

The Management Zone Settings panel lets you manage the global configuration settings for your Management Zone. These global configuration settings are inherited by other objects (devices, users, and folders) within your Management Zone and remain in effect unless they are overridden at the folder or object level.

You should configure the global settings to accommodate the largest possible number of objects, and then use the override option on any objects you want to configure differently. For example, you should use the *Device Refresh Schedule* setting to define the schedule that you want the majority of devices to use, and then override the schedule on individual devices or device folders if those devices require a different schedule. This is the best practice for almost all Management Zone configuration settings.

This section highlights configuration settings that you should consider setting at the global level, then adjust as needed at the folder or object level. Not all settings are covered in this section because they might not be relevant in your given situation, or they might differ greatly to what we would minimally recommend. For more information, see "Management Zone Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

The following sections contain more information:

- "Content Blackout Schedule" on page 49
- "ZENworks Explorer Configuration" on page 49
- "System Variables" on page 49
- "Content Replication Schedule" on page 50
- "Local Device Logging" on page 50
- "Device Refresh Schedule" on page 51
- "Device Removal Schedule" on page 52
- "Dynamic Groups Refresh Schedule" on page 53
- "Closest Server Rules" on page 53
- "Client Retries" on page 56
- "Inventory Schedules" on page 57

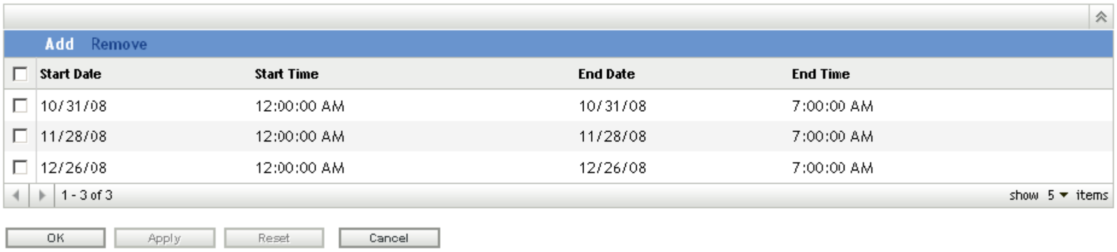
Content Blackout Schedule

You should define a Management Zone setting only if you are sure that you want to use this setting for all devices. In normal environments, you should not use a common blackout schedule for all devices.

A content blackout schedule is needed only for special devices, such as device in the finance department or production PCs that are used for controlling production processes.

The following graphic shows a corporate (global) blackout schedule of the last Friday of every month, from 12:00 a.m. until 7:00 a.m. In this case, no content is sent to managed devices during this time.

Figure 4-3 *Blackout Schedule in ZENworks Control Center*



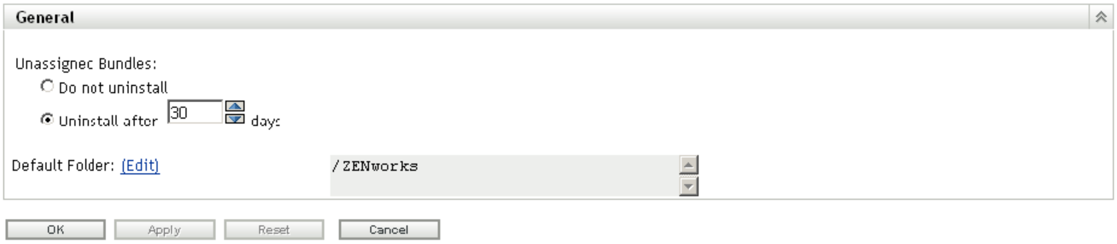
□	Start Date	Start Time	End Date	End Time
□	10/31/08	12:00:00 AM	10/31/08	7:00:00 AM
□	11/28/08	12:00:00 AM	11/28/08	7:00:00 AM
□	12/26/08	12:00:00 AM	12/26/08	7:00:00 AM

For more information, see "Management Zone Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

ZENworks Explorer Configuration

This setting defines the uninstall feature. If your customer does not need to uninstall applications, disable this feature in your Management Zone.

Figure 4-4 *General Section in ZENworks Control Center*



General

Unassignec Bundles:

○ Do not uninstall

● Uninstall after 30 days

Default Folder: (Edit) /ZENworks

For more information, see "Content Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

System Variables

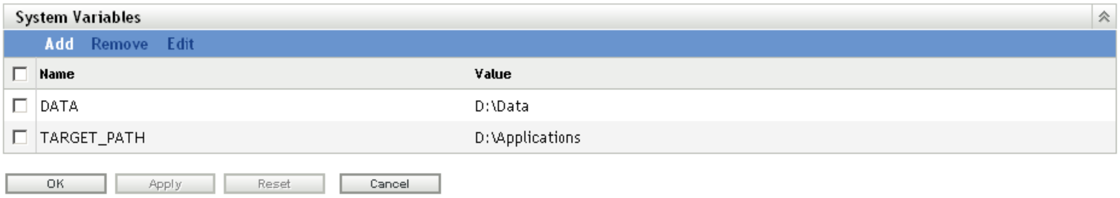
System variables are used to define paths, names, and other items in your system. In addition to the predefined variables, Novell recommends using variables in bundles. This makes it much simpler to create, manage, and deliver applications moving forward. You need to standardize on this early and stay with your standard.

Common variables are SOURCE_PATH or TARGET_PATH

- Define variables for your Management Zone.
- Define variables for your folders if you need different or additional settings.
- Define variables in your bundles only if the above settings do not fit your needs.

The following is an example of system variables that are set at the Management Zone level. These can then be used in bundles for distribution. Because these are set at the Management Zone level, it is assumed that these variables are resolvable on any device registered in the Management Zone.

Figure 4-5 *System Variables in ZENworks Control Center*



□	Name	Value
□	DATA	D:\Data
□	TARGET_PATH	D:\Applications

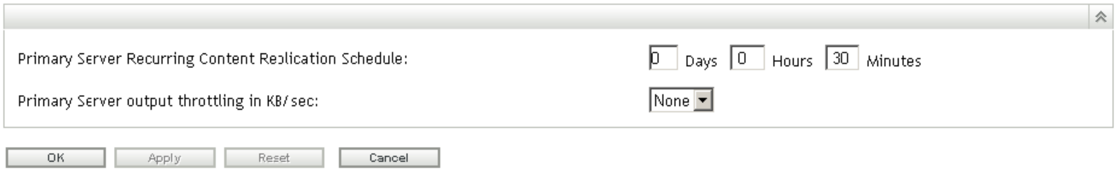
For more information, see "Content" in the *ZENworks 10 Configuration Management System Administration Reference*.

Content Replication Schedule

The content replication schedule defines how often a Primary Server that has assigned content checks the database for updates (new content or deleted content).

Novell recommends changing the default value (5 Minutes) to at least 30 minutes to protect the system from heavy loads that could lead to utilization issues. This gives you enough time to ensure that content is always up-to-date across all your systems in the Management Zone.

Figure 4-6 *Content Replication Schedule in ZENworks Control Center*



Primary Server Recurring Content Replication Schedule: 0 Days 0 Hours 30 Minutes

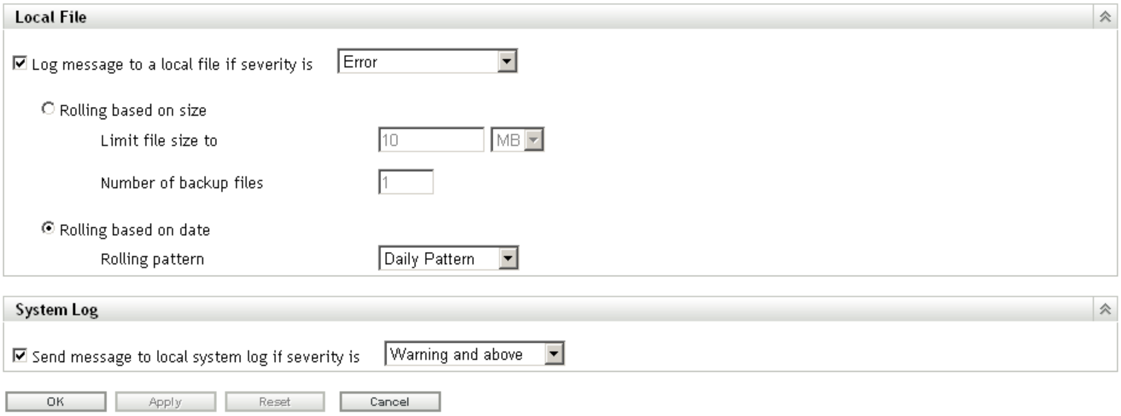
Primary Server output throttling in KB/sec: None

Local Device Logging

Use a severity setting of *Error* for log messages. If you set the severity to *Warnings and Above*, you might end up collecting more data than you really need. If you understand the errors you are encountering, this is more than enough for troubleshooting your infrastructure.

This settings page allows you to set the rollup schedule for a specific time or date. We recommend that you create a new log file every day to ensure accurate information for troubleshooting purposes.

***Figure 4-7** Log Settings in ZENworks Control Center*



Local File

☑ Log message to a local file if severity is: Error

○ Rolling based on size

Limit file size to: 10 MB

Number of backup files: 1

● Rolling based on date

Rolling pattern: Daily Pattern

System Log

☑ Send message to local system log if severity is: Warning and above

For more information, see "Device Management Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

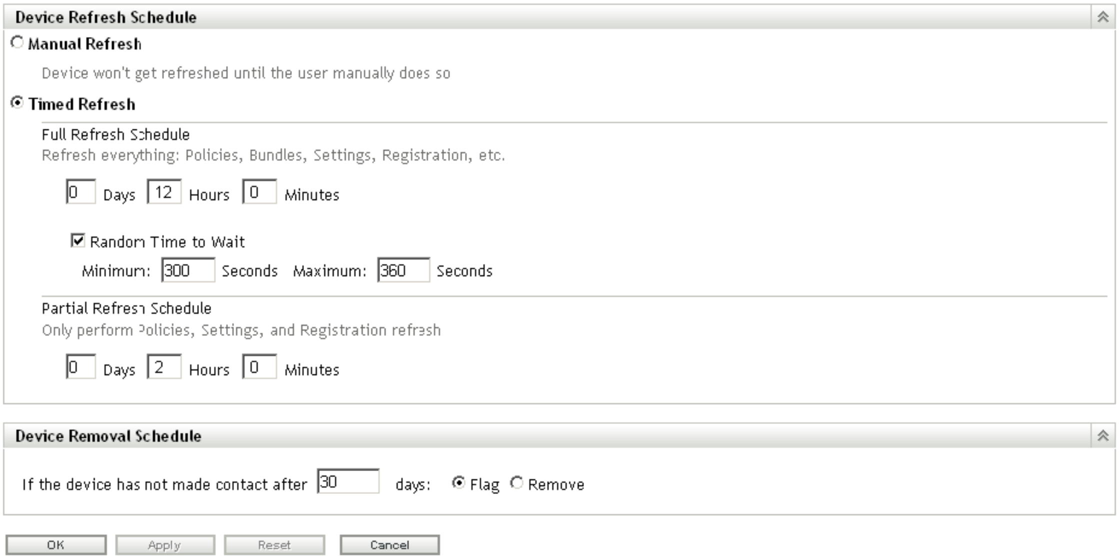
Device Refresh Schedule

Use the default schedule as a starting point. Discuss the schedules with your customer and adjust according to their needs. This information should have been collected during the assessment phase of your project. Remember, shorter refresh schedules means more frequent ZENworks Configuration Management traffic on the network. This could cause issues with over-utilization of available bandwidth. Make sure you involve the network management team when you decide on this setting.

Short refresh times for a large number of devices can also cause extensive server load, which might cause distribution failures or failures at the server side (uploading inventory and so forth).

Use random refresh rates to future prevent server overload during peak periods. This setting can be instrumental in increasing the scalability of the infrastructure components. Remember, the tests Novell performs in the SuperLab are designed to test the breaking point of the components. In the real world, thousands of devices should not regularly contact a server in the Management Zone.

Figure 4-8 *Device Refresh Schedule in ZENworks Control Center*



Device Refresh Schedule

○ Manual Refresh

Device won't get refreshed until the user manually does so

● Timed Refresh

Full Refresh Schedule

Refresh everything: Policies, Bundles, Settings, Registration, etc.

0 Days 12 Hours 0 Minutes

☑ Random Time to Wait

Minimum: 300 Seconds Maximum: 360 Seconds

Partial Refresh Schedule

Only perform Policies, Settings, and Registration refresh

0 Days 2 Hours 0 Minutes

Device Removal Schedule

If the device has not made contact after 30 days: ● Flag ○ Remove

For more information, see "Device Management Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

Device Removal Schedule

This setting needs to be discussed in detail with the customer during the assessment and design phases to ensure that you are removing devices that should be removed. You want to avoid removing devices that have been inactive for a certain number of days because the inactivity might result from circumstances such as maternity leave or a leave of absence. The customer should be able to give you the details on how long these situations should last, and what is acceptable. After you have this information, you can configure the schedule appropriately.

Take the following into consideration when setting up the schedule:

- How do we maintain actual reporting data? Do you need very accurate data?
- How long are the devices off-line (average time)? Possible cases are vacation, illness, maternity leave, extended leave of absence, and so forth.
- Do you need statistics on removed devices?

If devices are to be flagged for removal and not actually removed from the Management Zone, these devices can be easily found by specifying the Device State as *Lost* when searching for devices.

If you are required to report on all devices, even if they are not active on the network, managed devices can be "retired" instead of removed. When a managed device is retired, its identity and inventory information is retained but all policy and bundle assignments are removed. A retired device is in a holding state until you unretire or delete the device from the Management Zone.

For more information on retiring devices, see "Retiring or Unretiring Devices"in the *ZENworks 10 Configuration Management Discovery, Deployment, and Retirement Reference*.

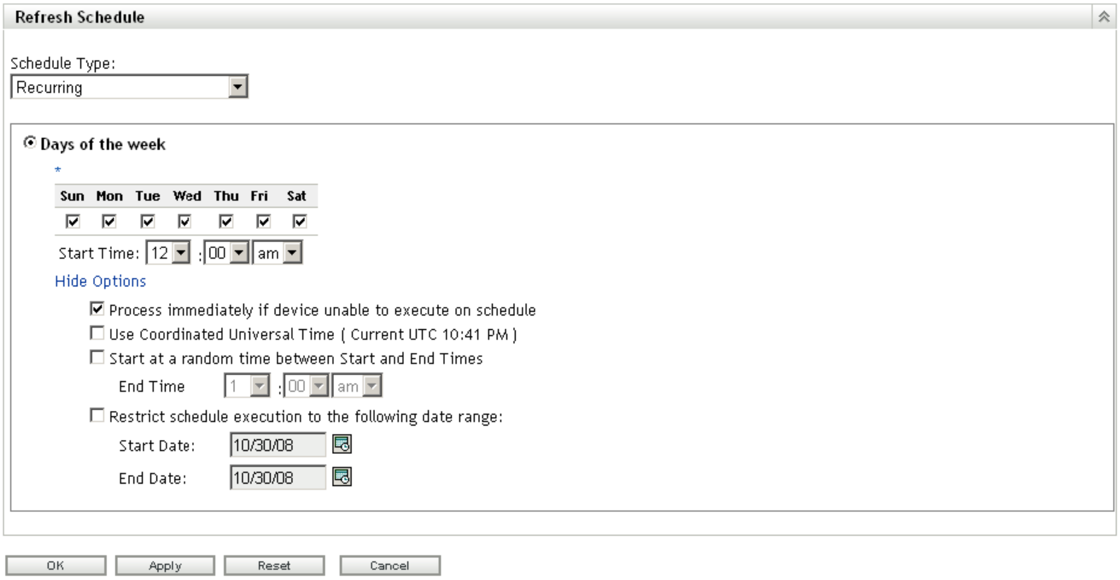
For more information, see "Device Management Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

Dynamic Groups Refresh Schedule

Novell recommends the use of dynamic groups wherever possible. The membership of these groups is recalculated on a regular basis to get the expected (and accurate) results.

For your initial configuration, Novell recommends a daily refresh schedule (*All days of the Week*). This ensures that the membership lists of the dynamic groups accurately represent what you have registered in the system.

Figure 4-9 *Refresh Schedule in ZENworks Control Center*



Refresh Schedule

Schedule Type: Recurring

● Days of the week

*

Sun	Mon	Tue	Wed	Thu	Fri	Sat
☑	☑	☑	☑	☑	☑	☑

Start Time: 12 : 00 am

Hide Options

☑ Process immediately if device unable to execute on schedule

□ Use Coordinated Universal Time (Current UTC 10:41 PM)

□ Start at a random time between Start and End Times

End Time 1 : 00 am

□ Restrict schedule execution to the following date range:

Start Date: 10/30/08

End Date: 10/30/08

For more information, see "Device Management Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

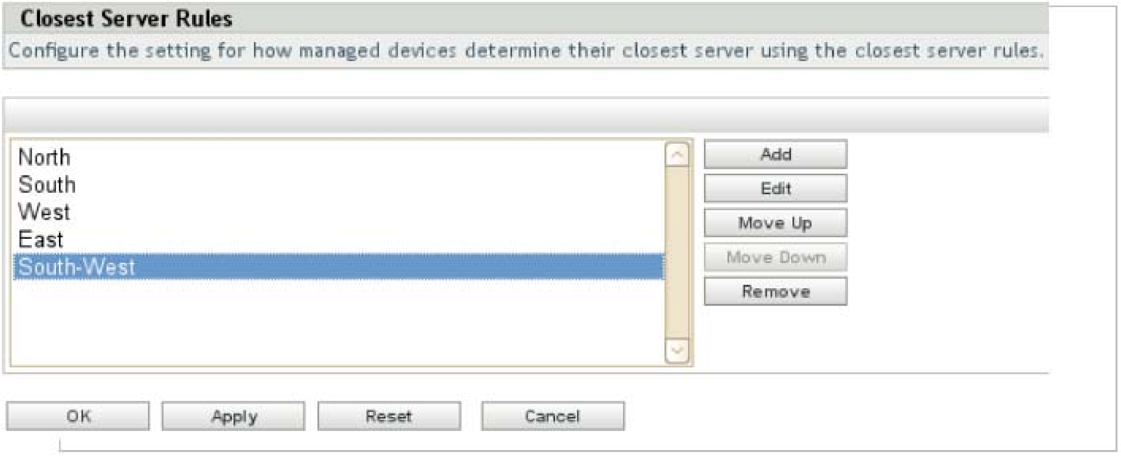
Closest Server Rules

Understanding and configuring Closest Server Rules is essential to a successful ZENworks Configuration Management infrastructure. Closest Server Rules are used to inform devices which Primary Servers and Satellite Devices to contact and in which order. This should take into account placement of ZENworks Primary Servers and Satellite devices. These rules might change as the design changes, so ensure that the requirements are tracked.

General rules to follow include:

- If you have servers on different subnets, define a rule for each subnet.
- If you have devices in different domains or sub-domains, set up a rule for each domain and sub-domain.
- Define the Closest Server Rules by using the OR logic, so fewer rules are required.
- The Closest Server Rules are processed sequentially, so the list order is very important. A simple calculation of *Estimated Number of Agents / Filter Sets in a Rule (Subnets)* should determine the best list order.

Figure 4-10 *Closest Server Rules in ZENworks Control Center*



Closest Server Rules

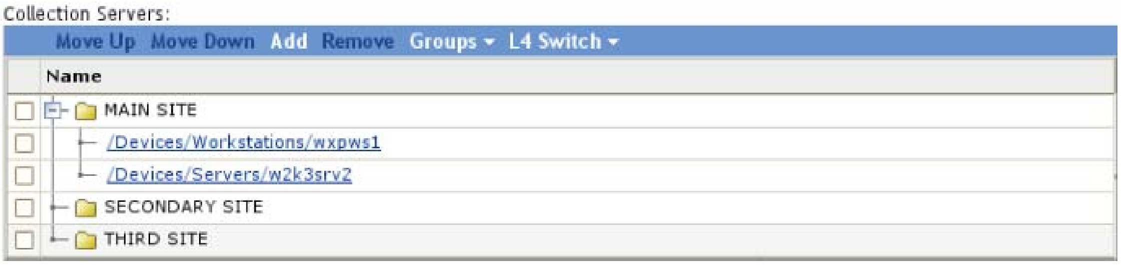
Configure the setting for how managed devices determine their closest server using the closest server rules.

- North
- South
- West
- East
- South-West

Within each rule, there is a Server list for each function that a ZENworks Primary server performs for the agent (Collection, Configuration, and Content). Each server list is ordered and the devices use this order for failover in case of high server utilization or a server-down scenario.

To balance the load, we recommend using Closest Server Groups. A Server Group is a list of Primary servers and Satellite devices that can be accessed in a random order. By randomizing server access, it is possible to balance the number of requests sent to each ZCM Server listed in the group.

Figure 4-11 *Closest Server Groups*



Collection Servers:

	Name
□	MAIN SITE
□	/Devices/Workstations/wxpws1
□	/Devices/Servers/w2k3srv2
□	SECONDARY SITE
□	THIRD SITE

If load balancing and fault tolerance is a fundamental requirement of the infrastructure, the best way to achieve it is though a Layer 4 (L4) switch. An L4 switch can front either Primary Servers or Satellite devices, or both, in order to guarantee results when directing traffic to the devices behind the switch. Most importantly, it ensures that services are always available to the end user community. If you use an L4 switch, ensure that it is properly configured. If the switch is not properly configured, the traffic is not properly directed, and there might be issues with connections, responses, and so forth.

The Layer 4 switch is configured in the Closest Server Rules in a similar way to the Closest Server Groups. When prompted, specify the Layer 4 definition name, which must be either the DNS name or IP address of the Layer 4 virtual device.

Keep in mind the following considerations:

- The Layer 4 switch definition is displayed in each of the listings, no matter where it is created, with the selected servers listed under each instance of the Layer 4 switch.

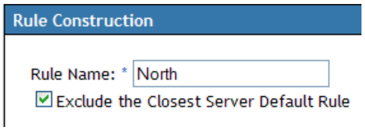
- Servers can be members of multiple groups and L4 switch definitions.
- Servers that are members of an L4 switch definition or group are no longer listed at the top level of the server listing.

If there are no matching Closest Server Rules for a given device, the managed device falls back to the default Closest Server Rule. This rule is an ordered list of all the ZENworks Configuration Management Primary and Satellite devices installed in the Management Zone. The list must be ordered so that all the ZENworks Configuration Management Primary Servers are at the top and all the ZENworks Configuration Management Satellite devices are at the bottom.

You might want to exclude the default Closest Server Rule for the following reasons:

- **Agent refresh speed:** When a device is refreshed, the applicable ZENworks Configuration Management Primary and Satellite device list for a device is calculated, serialized, and sent via the SOAP service. Excluding the default Closest Server Rule optimizes the response from the server, which also shortens the time required to complete a refresh.
- **Satellite devices:** Devices at one site should not attempt to access a Satellite device or Primary Server at another location. Excluding the default Closest Server Rule ensures that a device only connects to Satellite server if it is in the Closest Server rule for that subnet. If a Satellite device is temporarily unavailable, this ensures that content is not pulled across a WAN connection by local devices.
- **Server roles:** If a Primary server is dedicated to a particular task, such as reporting, excluding the default Closest Server Rule ensures that devices do not attempt to use this server for other services.

Figure 4-12 *Excluding Server Rules*

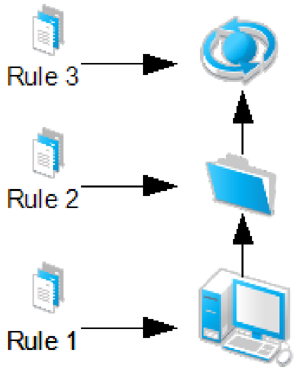


Rule Name: * North

☑ Exclude the Closest Server Default Rule

If there are duplicate addressing schemes within the environment, such as if two remote sites both use NAT (Network Address Translation) and the internal IP address scheme for both networks is 192.168.0.0, it is not possible for a Closest Server Rule to differentiate between the two subnets. The solution is to configure Closest Server Rules for each of these subnets at the folder level and override the Management Zone settings. This is successful only if the ZENworks folder structure ensures that the device objects for the two subnets are in separate folders.

Figure 4-13 Effective Closest Server Rules



Closest Server Rules can be configured at three levels: Management Zone, Folder and Device. The rules are evaluated on the device first. If no matching rule is found, the device's folder is evaluated. If there is no match on the device or the folder, the Management Zone rules are evaluated. Finally, if the Management Zone Closest Server Rules are not applicable, the default Closest Server Rules are used. For the diagram above, the order of evaluation is Rule1, Rule2, Rule3.

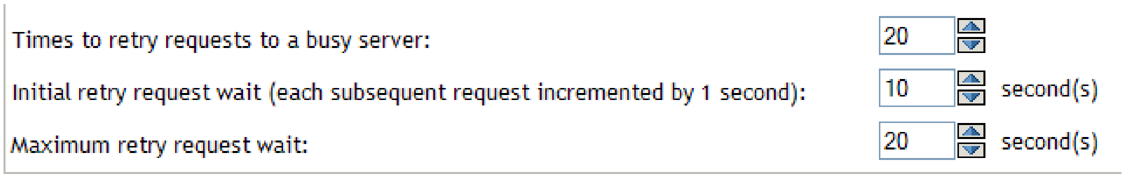
For more information, see "Infrastructure Management Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

Client Retries

At every client refresh, all Primary Servers and Satellite devices are marked as Unknown. When a particular module requires a service, the Connection Manager (based on the Closest Server Rules) makes a call to the first Primary Server or Satellite device hosting this service. If a Primary Server or Satellite device is down or is not contactable, it is immediately marked as Bad. If it is in a Busy state, it returns a busy error and the client waits and retries again.

There are three settings that control how many times and for how long a managed device should wait before marking a Primary Server or Satellite device as Bad and then moving to the next Primary Server or Satellite device in the closest server rule. These three client settings are available in ZENworks Control Center, under *Configuration* > *Device Management* > *ZENworks Agent*.

Figure 4-14 Client Retry Settings



Times to retry requests to a busy server:	20	
Initial retry request wait (each subsequent request incremented by 1 second):	10	second(s)
Maximum retry request wait:	20	second(s)

- **Times to Retry Requests to a Busy Server:** The maximum number of retries a device attempts to contact a Busy Primary Server or Satellite device.
- **Initial retry request wait:** The initial wait time between each of the above retries. All subsequent waits increment by 1 second. This means that the first wait time is 10 seconds, the second wait time is 11 seconds, then 12 seconds, 13 seconds and so on, up to the amount in the *Number of Retries* setting.

- **Maximum retry request wait:** The maximum time the device waits between retries.This overrides the incremental time to wait in the *Initial retry request wait* setting.

If a Primary Server or Satellite device is contactable but busy, a client waits for the initial wait period, retries, increments the wait interval by the value specified, then retries again. This process continues until the number maximum retries has been reached or until the connection load on the server goes down. The default settings in ZENworks Configuration Management are 20 retries, an initial wait time of 10, and a maximum wait time of 20. This means that a device waits a maximum of 345 seconds before marking a busy Primary Server or Satellite device as Bad. All the HTTP or HTTPS calls are sequential, so if the closest server rules are correctly configured, the wait should be very short. Connecting to a different Primary Server or Satellite device might not be the best option because it might be overloaded or across a low-bandwidth, high-latency connection.

These settings should be based on the placement of Primary Servers and Satellite devices within the environment. If there are many Primary Servers in a location connected to the clients by high-bandwidth, low-latency links, these settings can be lowered. If there are fewer Primary Servers and clients connecting over low-bandwidth, high-latency links, or to a Satellite device across a WAN, these settings can be increased to "wait out" the busy period. These settings can be overridden on the device or folder level.

During Novell testing, retries were set at 60/30/60. A server was never marked as Bad, and all content was delivered. No degradation of performance at the client was observed when the retries were set high.

Inventory Schedules

Inventory scan frequency depends on how often the hardware and software in the environment changes, and how accurate the information needs to be. Under normal circumstances, it should be adequate to collect inventory data on a weekly, biweekly, or monthly basis, but this might not be sufficient for all deployments. Be aware of the workload placed on the ZENworks Primary Servers. Every inventory scan a device does must be processed by the ZENworks Primary Server and stored in the ZENworks database. Ensure that the schedule does not unnecessarily scan thousands of devices on a daily basis, but if this is necessary, closely monitor the load and performance of both the Primary and database servers. Inventory schedules can be set at the Management Zone folder, and device level. We recommend that you configure inventory schedules on a folder basis to ensure that the load is spread through a given time period. If you must immediately update the inventory of a device, a scan-now request can be sent to the device via ZENworks Control Center.

For a weekly scan, select a day that is most likely to capture the largest number of devices connected to the network. To capture all workers, consider doing a scan on every fifth day so that all days are eventually targeted.

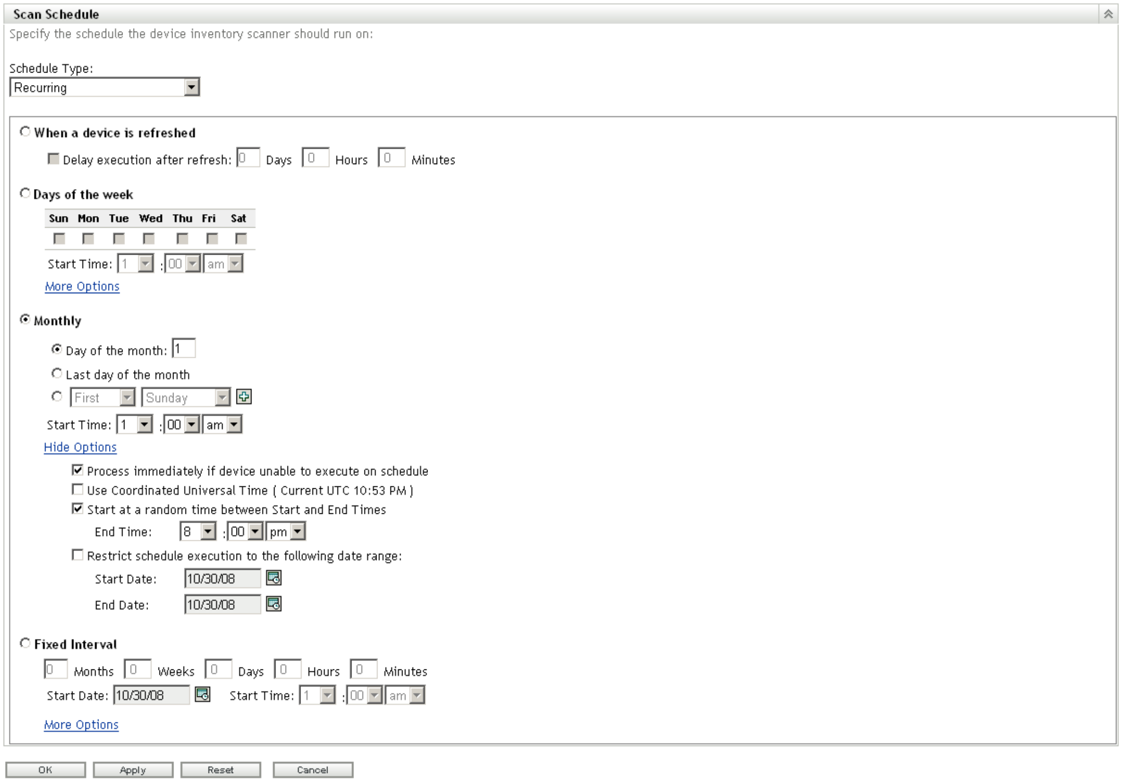
For restricted scan times, use the random wait time carefully. If a scan window of 9:00–17:00 is configured with the *Randomize scan time* option, devices that disconnect during this period might not be scanned. This can cause many to consistently miss their scans. The *Process immediately if device unable to execute on schedule* option instructs any device that missed the schedule to scan when it next connects to ZENworks. This is useful for ensuring that devices perform an inventory when they are offline during their assigned inventory schedule.

Use a schedule that best fits the environment and avoiding restricting the scan times severely. A very small "scan potential" window can lead to many devices not performing regular inventory scans.

If some devices are always on, consider starting the scan schedule before or after normal office hours, so these devices can be processed when there is low utilization.

We recommend using a combination of inventory reporting and the advanced device search function to compare last scan dates with last contact dates, so you can ensure that devices are being scanned according to their schedules.

Figure 4-15 *Scan Schedule in ZENworks Control Center*



Scan Schedule

Specify the schedule the device inventory scanner should run on:

Schedule Type: Recurring

○ When a device is refreshed

□ Delay execution after refresh: 0 Days 0 Hours 0 Minutes

○ Days of the week

Sun	Mon	Tue	Wed	Thu	Fri	Sat
□	□	□	□	□	□	□

Start Time: 1 : 00 am

More Options

● Monthly

● Day of the month: 1

○ Last day of the month

○ First Sunday

Start Time: 1 : 00 am

Hide Options

☑ Process immediately if device unable to execute on schedule

□ Use Coordinated Universal Time (Current UTC 10:53 PM)

☑ Start at a random time between Start and End Times

End Time: 8 : 00 pm

□ Restrict schedule execution to the following date range:

Start Date: 10/30/08

End Date: 10/30/08

○ Fixed Interval

0 Months 0 Weeks 0 Days 0 Hours 0 Minutes

Start Date: 10/30/08 Start Time: 1 : 00 am

More Options

For more information, see "Inventory Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

4.2.5 Device Discovery

When it comes to device discovery, you need to perform your discoveries and deployments in stages. Use the recommendations in this section for discovery and deployment in order to avoid massive amounts of discovery traffic on the LAN/WAN.

Some ideas to consider when performing device discovery include:

- Discover assets subnet by subnet.
- Discover assets building by building.
- Discover assets site by site.
- Import devices from Active Directory or eDirectory by using LDAP discovery tasks
- Import devices from a spreadsheet (CSV) if they are well documented and the list is available for you to use.

- Use the ZENworks Migration Wizard to migrate your devices from eDirectory and target them for deployment to avoid discovery of the initial assets that are already part of an existing ZENworks system.
- Use pilot groups.

These tips help you discover assets and roll out the ZENworks Adaptive Agent in a very manageable way, which avoids failures for deployment and installation.

Table 4-1 lists the duration and CPU usage for a discovery task performed by using the MAC Address technology. This information helps you configure the discovery settings in an efficient way.

Table 4-1 *Duration and CPU Usage for a Discovery Task*

IP Address Range	Duration of the Discovery Task	CPU Usage	Additional Details
Single IP address	Less than 1 minute	Less than 5%	The discovery task starts immediately when it is launched.
164.99.94.0–164.99.94.255 (254 devices)	10 minutes	5%	The discovery task starts immediately when it is launched.
164.99.0.0–164.99.255.255 (65,534 devices)	30 hours	36%	The discovery task starts immediately when it is launched.
164.0.0.0–164.255.255.255 (16,277,214 devices)	Always in a *Pending* state	100%	◆ The discovery task is not started. The status of the task remains as *Pending*. ◆ CPU usage is normal 10 minutes after the time the discovery task is launched. ◆ If any other discovery or loader task is running simultaneously, it might take a considerable time to complete.

There are several things you can do to increase the speed of IP Discovery tasks.

- Increase the *Maximum Concurrent Discoveries* from 5 to 20. This allows more addresses to be scanned simultaneously.
- Select only the discovery technologies that are required. We recommend enabling only the discovery technologies that are configured within the environment. If SSH, NMAP, or SNMP is not available or is not configured in the environment do not enable it. Every discovery technology that is scanned for an IP address adds time to the discovery task. As a rule of thumb, start with only WinAPI and the ZENworks discovery technologies enabled for the Management Zone. You can override discovery technologies in the Discovery task, which means that specific discovery technologies can be directed at certain subnets.

- Configure only the necessary authentication credentials. The more authentication credentials that are configured, the longer each scan takes.
- Disable the MAC Address discovery technology. Any device with a MAC Address is discovered via this technology. The devices show up in the discovered list with an Unknown operating system, which causes the deployable device list to be inaccurate.

All discoveries are performed from the *Deployment* tab in ZENworks Control Center.

Agent State

A Discovery task returns Management Zone information on devices with a ZENworks Configuration Management Agent installed. The discovered devices can be viewed from the ZENworks Control Center > Devices > Discovered tab. It is possible to see which devices are registered with another Management Zone and which agents are currently unregistered.

The name of a managed device residing within the same Management Zone as the Primary server is displayed in green and the name of the managed device residing in a different management zone is displayed in the yellow.

Schedule

A discovery only returns device information if the device is turned on and contactable. A discovery task should be run regularly on different days and times to ensure the entire environment is captured.

For more information, see “Device Discovery” in the *ZENworks 10 Configuration Management Discovery, Deployment, and Retirement Reference*.

4.2.6 Adaptive Agent Deployment

Novell ZENworks Configuration Management provides a variety of methods you can use to install the ZENworks Adaptive Agent to devices:

- Use ZENworks Control Center to deploy the agent from the ZENworks Server to the device.
- At the device, use a Web browser to download and install the Agent from the ZENworks Server.
- Include the Agent in an image and apply the image to the device.
- Use a login script, Windows group policy, or ZENworks 7 Application object to install the Agent.

Because ZENworks Configuration Management is usually implemented in larger environments, we recommend deploying the ZENworks Adaptive Agent automatically; you should not manually install the Agent.

The following sections contain more information:

- “Default Deployment Packages” on page 61
- “Custom Deployment Packages” on page 61

Default Deployment Packages

The best option for accessing the default deployment packages is through ZENworks Control Center:

1. From the *Home* page in ZENworks Control Center, click *Download ZENworks Tools* in the left frame.
2. Download the default package that you require.

We recommend using one of the following deployment methods:

- Use the *Deployment* task from ZENworks Control Center, after discovering or importing devices.
- Use your existing software distribution tool to deploy the agent.
- Include the ZENworks Adaptive Agent in a new image.

For all methods you must have registration keys in place as described in Section 4.2.7, "Registration Rules and Keys," on page 61.

For more information, see the *ZENworks 10 Configuration Management Discovery, Deployment, and Retirement Reference*.

Custom Deployment Packages

During the ZENworks Configuration Management installation, default ZENworks Adaptive Agent deployment packages are created. These packages are tied to the ZENworks Primary Server and contain the URI from this server to register devices. There are no registration keys configured and the registration process use default rules to register devices.

It is best practice to always use custom deployment packages when pushing the ZENworks Adaptive Agent to your discovered or imported devices. You should avoid the use of the default Agent deployment packages that are created because these include only default parameters that likely do not meet the needs of the customer.

You must be familiar with these concepts before testing begins.

4.2.7 Registration Rules and Keys

When you deploy the ZENworks Adaptive Agent to a device, the device is registered in the Management Zone and becomes a managed device. As part of the registration, you can specify the device's ZENworks name and the folder and groups to which you want the device added.

By default, when a device's host name is used as its ZENworks name, it is added to the `/Servers` or `/Workstations` folder, and it is not given membership in any groups. You can manually move devices to other folders and add them to groups, but this can be a burdensome task if you have a large number of devices or if you are consistently adding new devices. The best way to manage a large number of devices is to have them automatically added to the correct folders and groups during registration.

To add devices to folders and groups during registration, you can use registration keys, registration rules, or both. Both registration keys and registration rules let you assign folder and group memberships to a device. However, there are differences between keys and rules that you should be aware of before choosing whether you want to use one or both methods for registration.

The following sections contain more information:

- "Registration Rules" on page 62
- "Registration Keys" on page 62
- "Recommendations Regarding Registration" on page 62
- "Registration" on page 63

Registration Rules

If you don't want to enter a registration key during deployment, or if you want devices to be automatically added to different folders and groups based on predefined criteria (for example, operating system type, CPU, or IP address), you can use registration rules.

ZENworks Configuration Management includes a default registration rule for servers and another one for workstations. If a device registers without a key, the default registration rules are applied to determine the folder and group assignments. The two default rules cause all servers to be added to the `/Servers` folder and all workstations to the `/Workstations` folder.

The two default rules are designed to ensure that no server or workstation registration fails. Therefore, you cannot delete or modify these two default rules. You can, however, define additional rules that enable you to filter devices as they register and add them to different folders and groups. If you've established folders for devices with similar configuration settings and groups for devices with similar assignments, newly registered devices automatically receive the appropriate configuration settings and assignments.

For more information, see "Registration Rules" in the *ZENworks 10 Configuration Management Administration Quick Start*.

Registration Keys

A registration key is an alphanumeric string that you manually define or randomly generate. During deployment of the ZENworks Adaptive Agent on a device, the registration key must be provided. When the device connects to a ZENworks Server for the first time, the device is added to the folder and groups defined within the key.

You can create one or more registration keys to ensure that devices are placed in the desired folders and groups. For example, you might want to ensure that all of the Sales department's workstations are added to the `/Workstations/Sales` folder but are divided into three different groups (SalesTeam1, SalesTeam2, or SalesTeam3) depending on their team assignments. You could create three different registration keys and configure each one to add the Sales workstations to the `/Workstations/Sales` folder and the appropriate team group. As long as each workstation uses the correct registration key, it is added to the appropriate folder and group.

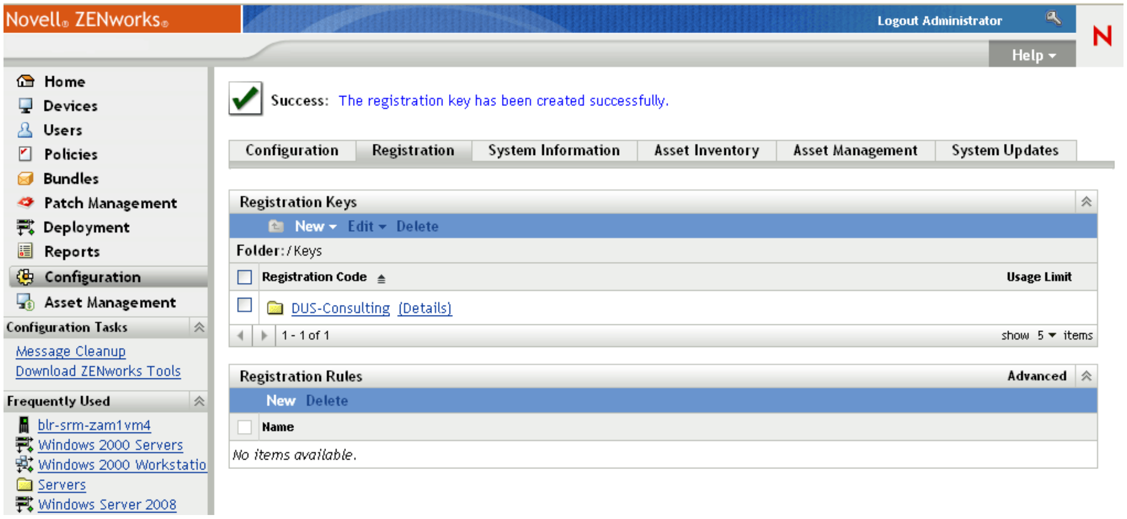
For more information, see "Registration Keys" in the *ZENworks 10 Configuration Management Administration Quick Start*.

Recommendations Regarding Registration

Based on your final folder and groups design, we recommend that you create registration keys for each folder you have created or defined.

The following graphic illustrates using registration keys to place devices in folders.

Figure 4-16 Registration Section in ZENworks Control Center



Success: The registration key has been created successfully.

Registration Code	Usage Limit
DUS-Consulting (Details)	

No items available.

New York City: Registers to folder New York City below USA.

France: Registers to folder Paris below France.

In combination with dynamic groups that are based on departments, it is possible to manage device registration very easily. You use these keys in your deployment packages to auto-register all devices in your Management Zone.

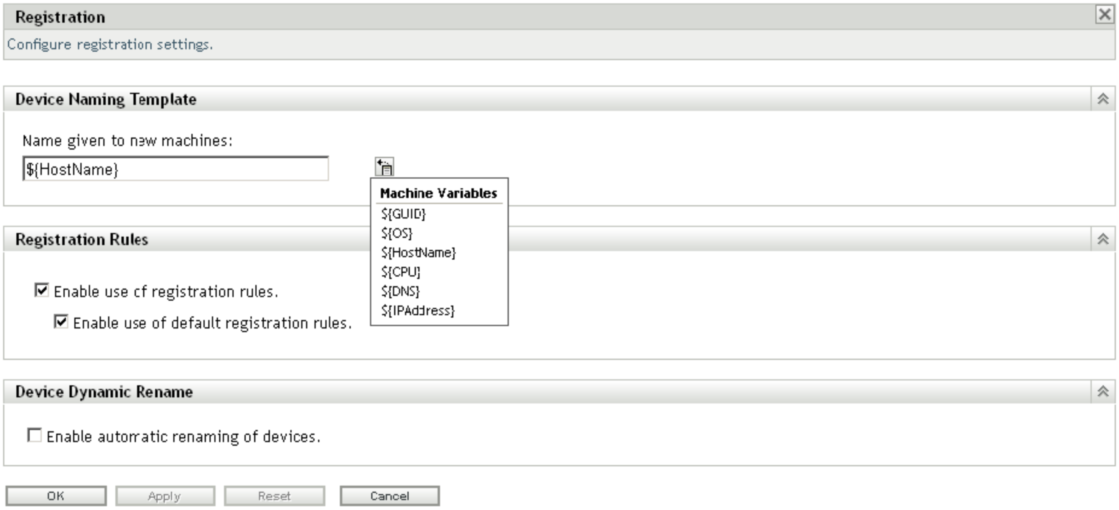
Registration

You should enable dynamic device renaming, which is disabled by default.

This feature provides a very flexible way to handle some desktop management processes such as renaming or re-installation. During the ZENworks Configuration Management framework-based installation process, the device name changes to a randomly generated name, but if this feature is place and you have a working imaging partition, all references are automatically maintained by the ZENworks Adaptive Agent registration process.

This prevents having duplicated device entries and GUIDs in the database.

Figure 4-17 Registration in ZENworks Control Center



Registration

Configure registration settings.

Device Naming Template

Name given to new machines: ${HostName}

Registration Rules

☑ Enable use of registration rules.

☑ Enable use of default registration rules.

Device Dynamic Rename

□ Enable automatic renaming of devices.

For more information, see “Device Management Settings” in the *ZENworks 10 Configuration Management System Administration Reference*.

4.2.8 Remote Management

All guidelines for Remote Management are concerned with the configuration settings for performance and security.

- “Security” on page 64
- “Performance” on page 65

Security

To prevent unauthorized access to the managed device, the Remote Management service on the managed device uses the following modes of access:

- “Rights-Based Remote Management Authentication” on page 64
- “Password-Based Remote Management Authentication” on page 65

Rights-Based Remote Management Authentication

In rights-based authentication, rights are assigned to the remote operator to launch a remote session on the managed device. By default, ZENworks administrators have rights to perform remote operations on all the managed devices regardless of whether the local user or the ZENworks user is logged in to the device.

The remote operator does not need any exclusive rights to perform a remote session on the managed device if no user has logged in to the managed device or if a user has logged in to the managed device but not in to ZENworks. However, the remote operator needs exclusive Remote Management rights to perform the remote operation on the managed device when a ZENworks user has logged in to the device. We strongly recommend using the rights-based authentication because it is safe and secure.

Password-Based Remote Management Authentication

In password-based authentication, the remote operator is prompted to enter a password to launch the remote session on the managed device. There are two types of password authentication schemes:

- **ZENworks Password:** This scheme is based on the Secure Remote Password (SRP) protocol (version 6a). The maximum length of a ZENworks password is 255 characters.
- **VNC Password:** This is the traditional VNC password authentication scheme. The maximum length of a VNC password is 8 characters. This password scheme is inherently weak and is provided only for interoperability with the open source components.

If you use password-based authentication, we strongly recommend using the ZENworks Password scheme because it is safer and more secure than the VNC Password scheme. Ensure that any passwords used are of an adequate length and complexity.

The password schemes operate in the following modes:

- **Session Mode:** A password set in this mode is valid only for the current session. The user on the managed device must set the password at the start of the remote session and communicate the password to the remote operator through out-of-band means. If you use password-based authentication, we strongly recommend that you use this mode of authentication because the password is valid only for the current session and is not saved on the managed device.
- **Persistent Mode:** In this mode, the password can be set by the administrator through the Remote Management policy or by the managed device user through the ZENworks icon if the *Allow user to override default passwords on managed device* option is selected in the security settings of the Remote Management policy.

If the password is set by both a remote control policy and the user, the password set by the user takes precedence over the password configured in the policy.

Performance

The performance features are enabled by default in the Remote Management policy or configuration page. They can be disabled, but we do not recommend doing this.

For more information, see "Device Management Settings" in the *ZENworks 10 Configuration Management System Administration Reference*.

4.2.9 Inventory

ZENworks Configuration Management contains a powerful feature for collection and reporting on software and hardware inventory in the environment. The configuration of the inventory collection should be managed before deployment to ensure that the devices are collecting only relevant information.

Inventory collection settings are split into three main sections. Each section is configured independently of the others.

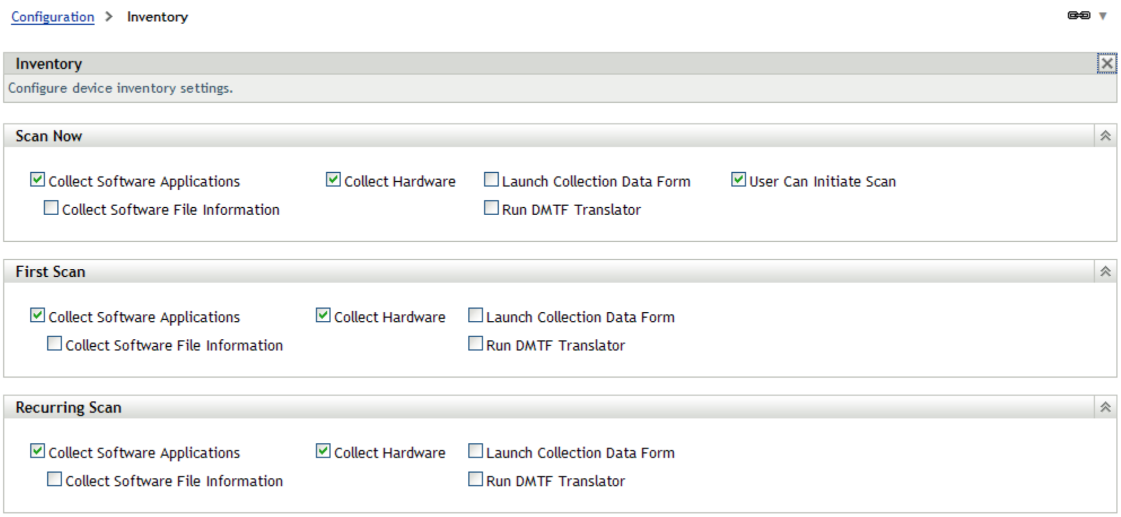
- **Scan Now:** If a device is manually forced to perform an inventory scan.
- **First Scan:** The first time the agent is installed and a scan happens. Controlled by the *Logins before first scan* configuration setting in ZENworks Control Center. This setting should complement the build process of the devices.

- **Recurring Scan:** Controlled by the Inventory Scan Schedule. See "Inventory Schedules" on page 57 for further information.
- "Software File Information" on page 66
- "Collection Data Form Schedules" on page 66

Software File Information

Select the *Collect Software File Information* option only if you must identify software products that aren't recognized by the ZENworks Knowledgebase. This option forces a very granular collection of inventory information, which has performance impacts throughout the ZENworks infrastructure. If you must create local software products based on software file information, we recommend that you override inventory settings only on the individual target devices.

Figure 4-18 *Inventory Scan Settings*



Configuration > Inventory

Inventory
Configure device inventory settings.

Scan Now

☑ Collect Software Applications
□ Collect Software File Information
☑ Collect Hardware
□ Launch Collection Data Form
□ Run DMTF Translator
☑ User Can Initiate Scan

First Scan

☑ Collect Software Applications
□ Collect Software File Information
☑ Collect Hardware
□ Launch Collection Data Form
□ Run DMTF Translator

Recurring Scan

☑ Collect Software Applications
□ Collect Software File Information
☑ Collect Hardware
□ Launch Collection Data Form
□ Run DMTF Translator

For more information, see "Creating Local Software Products" in the "ZENworks 10 Configuration Management Asset Inventory Reference"

Collection Data Form Schedules

The collection data form is used to collect demographic information for a device or user. The information can be collected on several schedules or events, or it can be collected manually. You can also use the *Scan Now*, *First Scan*, or *Recurring Scan* options. This information can be very useful when attempting to identify where devices are located and who is using them.

Select a schedule that best fits your requirements. Collecting this information on a monthly basis should be a good choice. Ensure that you run a new collection after a change, such as a move or user change.

Use the auto-fill function to avoid user input. System variables and registry settings can be used to silently collect the demographic data. These variables or settings can be delivered through the install process or through bundles. Administrator-defined fields should be created to collect additional information.

For more information, see "Scanning Demographic Data" in the *ZENworks 10 Configuration Management Asset Inventory Reference*

4.2.10 Application Management

You are not required to organize bundles into different folders, but we recommend that you use a minimal folder structure to divide applications and images. If bundles are organized logically and granularly, it becomes very easy to create special administrative accounts that only have limited rights to a given folder or set of folders.

- "Recommendations for Organizing Bundles" on page 67
- "Bundle Groups" on page 68
- "Assigning Bundles" on page 68
- "Importing and Exporting Bundles" on page 69
- "Application Delivery Mechanism" on page 70

Recommendations for Organizing Bundles

Every organization is different and has different requirements for organizing content. The important thing to keep in mind is that you should always organize your content according to how your organization views it. If you do not organize the content and simply put everything into the default folder, it becomes unmanageable within a very short time.

Keeping this in mind, some best practices for organizing your bundle objects include:

- Creating a folder for application bundles.
- Creating a folder for imaging bundles.

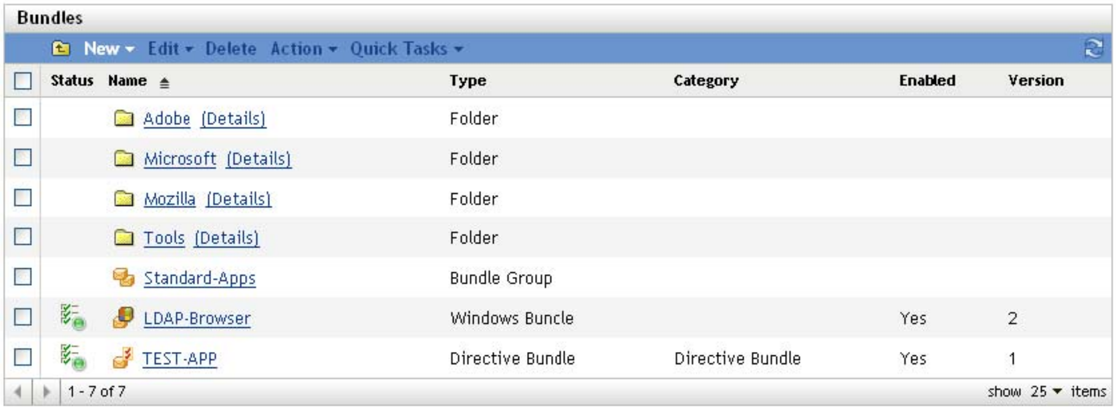
The `ZPM` folder is an auto-generated folder that contains all patch-service related bundles. Although the bundles in this folder can be changed and additional ones created, we recommend that you do not change the folder and the bundles within it.

We recommend that you create folders under the base Bundles folder to group imaging and application bundles together. The following list provides examples of the types of folders that can be created:

- Create a folder for software vendors:
    - Microsoft (Office, Internet Explorer, MediaPlayer)
    - Adobe (Reader, Photoshop)
    - SAP (Basis, HR)
    - Novell
- Create a folder for special applications:
    - CAD
    - Database applications
    - Software development
- Create a folder for tools:
    - Windows tools (WinZip, WinRAR, UltraEdit, and so forth)
- Create a folder for base images.
- Create a folder for add-on images.

Categorizing application and imaging bundles into separate folders also allows for administrator roles to be created so you can limit the bundles that an administrator can edit or assign to devices.

Figure 4-19 *Bundle Folders in ZENworks Control Center*



□	Status	Name	Type	Category	Enabled	Version
□		Adobe (Details)	Folder			
□		Microsoft (Details)	Folder			
□		Mozilla (Details)	Folder			
□		Tools (Details)	Folder			
□		Standard-Apps	Bundle Group			
□		LDAP-Browser	Windows Buncle		Yes	2
□		TEST-APP	Directive Bundle	Directive Bundle	Yes	1

The important thing is to arrange your content with your company organization in mind. This might be different with each company or site. This information should be gathered during the design phase of the project and detailed in the design document.

For more information, see “Managing Folders” in the *ZENworks 10 Configuration Management Software Distribution Reference*.

Bundle Groups

In addition to using folders, it is a good idea to create bundle groups for some applications to make assignments easier. Each group contains a set of bundles that belong together. These groups can be organized for special functions or tasks.

The following are some examples of how you might want to leverage bundle groups to keep things simple:

- APPS-Base: Contains all applications needed by all users.
- Finance-Applications: Contains bundles needed to work with finance applications.
- Help Desk-Tools: Contains bundles that are related to the Help Desk.

The following is a graphical representation of how you might want to leverage bundle groups:

For more information, see “Managing Bundle Groups” in the *ZENworks 10 Configuration Management Software Distribution Reference*.

Assigning Bundles

A major feature in ZENworks Configuration Management is the ability to inherit assignments from multiple places within the system. With this feature, it is very easy to assign a bundle or bundle group to many devices in seconds. You do not need to assign bundles to each device, which saves time and money.

Based on your folder and group design, we recommend that you use folder or group assignments instead of direct assignments. Use these indirect assignments wherever possible to increase speed and reduce administration effort. If you utilize folders and groups for as many of your assignments as possible, you can deliver updates to hundreds of devices when you need to get them there, even immediately.

Best practices on how to leverage folders and groups include:

- If you have a set of bundles that are required for all devices in a site, use the site folder to assign these bundles or bundle groups.
- If you have special bundles that are used in one or more departments, assign these bundles only to the department folders.
- If you have bundles that are used by several devices in different folders, set up groups for assignments.
- Only use direct assignments if a single device or a small number of devices need special assignments.

For more information, see “Managing Bundles” in the *ZENworks 10 Configuration Management Software Distribution Reference*.

Importing and Exporting Bundles

Novell best practice dictates that a new application or change to an existing application in the environment should use a testing phase that does not affect the production network. We recommend that a development zone (DEV-ZONE) be created with its own ZENworks Configuration Management structure that mirrors the production network. After an application has been approved for production deployment, it should then be moved from the DEV-ZONE to the production zone (PROD-ZONE). Currently there is no way to export MSI files from the Content Repository, so we recommend that all source files are retained; otherwise, there will be no source to be imported into production (see TID 7002543 (http://www.novell.com/support/) on the Novell Support page).

To export bundles:

1 From the DEV-ZONE ZCM server, export the bundle to a specific export directory by using the following command:

```
zman bundle-export-to-file /bundle_path/bundle_name bundle_filename.xml
```

If the application has no dependencies and is not a Windows MSI bundle, a single *bundle_filename*.xml is created. If there are dependencies or MSI content to be imported into the Content Repository, two files will be created: *bundle_filename*.xml and *bundle_filename*_ActionContentInfo.xml.

For example, you can export the officeXP bundle to officeXP.xml by using the zman bundle-export-to-file officeXP officeXP.xml command. The officeXP.xml and officeXP_ActionContentInfo.xml files are created.

2 Copy all files related to the application MSI (not all MSI files are self-contained) to the same application export directory. It is possible to place the application MSI is a separate folder; however, the following section of the *bundle_filename*_ActionContentInfo.xml file needs to be modified to specify the content location:

```
includeAllFilesinSubFolders="false">E:\files\ApplicationX.msi</
ContentFilePath>
```

3. Copy the entire directory by whatever method of communication is approved from the DEV-ZONE server to the PROD-ZONE server.
4. Create the bundle on the PROD-ZONE ZCM server by using the following command:

`zman bundle-create` `*new_bundle_name*` `bundle_xml_*filename*.xml bundlefolder --actioninfo bundle_name_ActionContentInfo.xml` (using `*/bundlefolder/bundlename*` results in an error because of invalid characters).

For example, use the following command to create a bundle called ApplicationX:

```
zman bundle-create OfficeXP officeXP.xml "/Bundles/Microsoft Applications"
--actioninfo officeXP_ActionContentInfo.xml
```

Application Delivery Mechanism

There are a number of different methods to deliver content to your managed devices with ZENworks Configuration Management.

- "Tomcat via HTTPS" on page 70
- "NetWare" on page 70
- "Microsoft" on page 71
- "Other Network Shares (NetStorage)" on page 71
- "Recommendation for the Delivery Mechanism" on page 72

Tomcat via HTTPS

Benefits:

- ZENworks Configuration Management controls the distribution of content to the various Satellite devices and Primary Servers that exist within the Management Zone.
- Data is encrypted within Tomcat, so anyone with file access to the server will not be able to access applications.
- HTTP is used to deliver content, rather than SSL, so there is no overhead to re-encrypt the content for transmission.
- Access to data is based upon the relationships defined within ZENworks Configuration Management. If you are not a target device or user of ZENworks Configuration Management, you have no access to application, image, or policy data.
- This is a firewall-friendly solution. It is very easy to allow DMZ access to content for remote, Internet-based devices, without cumbersome configuration changes on routers, switches, and firewalls.

Drawbacks:

- The ZENworks Configuration Management server becomes less scalable because it is serving more HTTP requests from managed devices.
- It can take some time before an application has finished encrypting and injecting its data into the Web server.

NetWare

You can use the Novell Client (Client32) and existing mapped network drives or directly via UNC to provision application data to your managed devices.

Benefits:

- Uses the existing infrastructure.
- Less overhead is required on the ZENworks Server.

Drawbacks:

- ZENworks Configuration Management has no control over the distribution of the application content. The distribution must be managed outside of ZENworks Configuration Management with products such as ZENworks Server Management.
- ZENworks Configuration Management has no control over who has access to the data.
- Application content is not encrypted and can potentially be installed by anyone with access to the server.
- This is not a firewall-friendly solution. Access from outside the firewall requires VPN access in order to deliver applications.

Microsoft

You can use Microsoft DFS shares, Active Directory servers, or file and print servers.

Benefits:

- Uses existing infrastructure servers.
- Less overhead is required on the ZENworks Server.
- Uses existing domain credentials of devices and users to control access to the files you are provisioning to managed devices.

Drawbacks:

- ZENworks Configuration Management has no control over the distribution of the application content. The distribution must be managed outside of ZENworks Configuration Management with products such as ZENworks Server Management or Microsoft DFS.
- ZENworks Configuration Management has no control over who has access to the data.
- Application content is not encrypted and can potentially be installed by anyone with access to the server.
- This is not a firewall-friendly solution. Access from outside the firewall requires VPN access in order to deliver applications.

Other Network Shares (NetStorage)

It is also possible to use NetStorage devices for content hosting and delivery of application content to your managed devices.

Benefits:

- Uses existing infrastructure.
- Less overhead is required on the ZENworks Server.

Drawbacks:

- ZENworks Configuration Management has no control over the distribution of the application content. The distribution must be managed outside of ZENworks Configuration Management.

- ZENworks Configuration Management has no control over who has access to the data.
- Application content is not encrypted and can potentially be installed by anyone with access to the server.
- This is not a firewall friendly solution. Access from outside the firewall requires VPN access in order to deliver applications.

Recommendation for the Delivery Mechanism

Novell recommends using the ZENworks Configuration Management internal delivery mechanism (HTTP) for bundles and policies. Although it might be easier to use other delivery methods you will lose most of the benefits within ZENworks Configuration Management. Some of these benefits include:

- Content replication capabilities
- Rights to the content store
- Data encryption and security wrapped around content

4.2.11 Policy Management

In general, it is not a good idea to have thousands of different policies in place to fulfill all requirements. In desktop management, there are usually sets of policies for certain groups, such as normal users, administrative users, and special user groups, such as software developers.

However, you might also want to organize policies in more than one folder to restrict access and administration to specific groups or users.

Some policies definitely need to be restricted to a set number of people within the organization (such as remote management policies), so you need to consider this best practice recommendation carefully.

However, it is a good idea to organize different sets of policies in different folders. In addition, we recommend that you use policy groups to put different policies together in a single package and then assign these policy groups to devices or users, (policy groups are loosely synonymous to policy packages in previous versions of ZENworks Desktop Management).

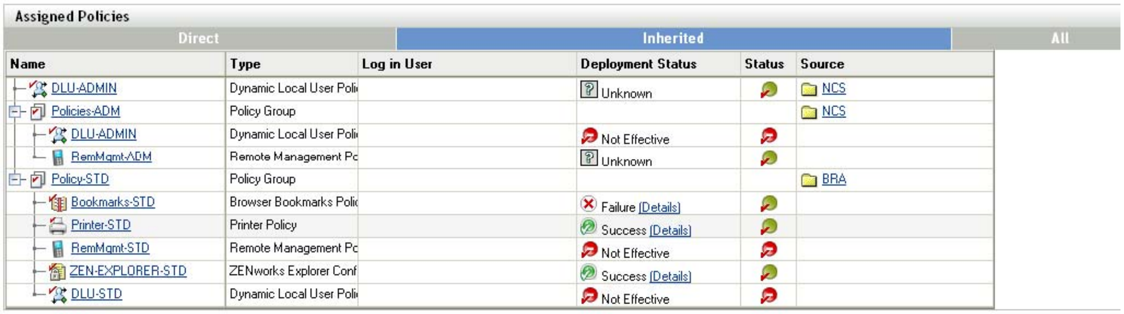
To make sure that every device receives the required and effective settings, we recommend that you define the order in which policies are applied. There are four options you can use here, and you need to understand your policy requirements before you make these decisions:

- Apply device policies first, user policies last (user-assigned policy wins)
- Apply user policies first, device policies last (device-assigned policy wins)
- Use only device policies
- Use only user policies

All policies are applied in the following order: folder, group, then device or user.

The following graphic shows the effective policies on a given device:

Figure 4-20 Assigned Policies Page in ZENworks Control Center



Assigned Policies

Direct | Inherited | All

Name	Type	Log in User	Deployment Status	Status	Source
DLU-ADMIN	Dynamic Local User Poli		Unknown	🟢	NCS
Policies-ADM	Policy Group				NCS
DLU-ADMIN	Dynamic Local User Poli		Not Effective	🔴	
RemMgmt-ADM	Remote Management Pc		Unknown	🟢	
Policy-STD	Policy Group				BRA
Bookmarks-STD	Browser Bookmarks Polic		Failure (Details)	🟢	
Printer-STD	Printer Policy		Success (Details)	🟢	
RemMgmt-STD	Remote Management Pc		Not Effective	🔴	
ZEN-EXPLORER-STD	ZENworks Explorer Conf		Success (Details)	🟢	
DLU-STD	Dynamic Local User Poli		Not Effective	🔴	

In the above example, there is a policy group assigned to a folder BRA. This group contains all policy settings (Policy-STD) that are required for all users in BRA. Additionally there is policy group assigned to the NCS folder (below BRA). Finally, there is a direct policy assignment to the NCS folder that modifies the DLU settings only.

The following sections contain more information:

- "Recommendations for Managing Policies" on page 73
- "Advantages to Assigning Group Policies through ZENworks Configuration Management" on page 73

Recommendations for Managing Policies

Organizing policies into folders and policy groups makes it easier to manage the assignment process to devices and users. When managing policies, you should consider the following items:

When managing policies, you should:

- Define user and device categories during the assessment phase, such as Standard-user, Administrative-user, Management-user, Help Desk-device, and so forth.
- Define required policies and sets that can be used for policy groups.
- Define the order in which policies are applied.
- Assign policy groups to folders as needed.
- Use folder or group assignments wherever possible.

Advantages to Assigning Group Policies through ZENworks Configuration Management

With ZENworks Configuration Management, you can use plural group policies, meaning you can layer multiple group policies on top of each other, applying what is referred to as effective policies at the endpoint level. Using ZENworks Configuration Management to do this allows you to handle roaming users effectively, making policies available to end users no matter where they are logging in from. Most organizations use group policies to manage the look and feel of the user's desktop experience. There are two choices when it comes to using Group Policies in your environment:

- Import your policy files into ZENworks Configuration Management and replicate them across your infrastructure.
- Deliver your policies though Microsoft Active Directory.

4.2.12 Imaging

We highly recommend that you adopt a methodology for creating and delivering Universal Images to your endpoints. A universal image is a single image of Windows XP, Windows Vista, or Windows 7 that can be deployed to multiple hardware types. After you have established the Universal Images, you can deliver core applications and line-of-business applications as add-on images during the imaging process. This method can be further extended to also provide hardware-specific drivers during the imaging process. Tools such as ENGL's Imaging Toolkit for ZENworks Configuration Management can be used to make the process of creating a Universal Image very easy to manage.

For more information, see the *ZENworks 10 Configuration Management Preboot Services and Imaging Reference*.

4.2.13 Configuring a Layer 4 Switch

ZENworks Configuration Management supports achieving load balancing and fault tolerance for your infrastructure services though using a Layer 4 (L4) switch. An L4 Switch can front either Primary Servers, Satellite devices, or both. This allows the organization to achieve guaranteed results when directing traffic to the devices behind the switch. Most importantly, this allows organizations to ensure that services are always available to their end user community.

NOTE: User Sources are not supported with an L4 Switch in place. For detailed information, see TID 7004684 at the Novell Support (http://www.novell.com/support/).

L4 switches are expensive and not affordable for many smaller organizations. Smaller organizations often turn to other forms of load balancing and fault tolerance solutions that are readily available to them. These include solutions such as DNS Round Robin, Microsoft Load Balancing Services, and other open source solutions on the market.

When you do use an L4 switch, you need to ensure that it is properly configured. If the switch is not configured properly, the traffic is not directed properly and there might be issues with connections, responses, and so forth.

The following sections explain the general requirements for properly configuring an L4 switch to be used in front of ZENworks Primary Servers and Satellite devices:

- "Foundry Networks ServerIronXL Configuration" on page 74
- "Summary of Configuration Settings" on page 75
- "Configuring the Closest Server Default Rule" on page 76
- "Configuring an L4 Switch Definition from Selected Servers" on page 76
- "Additional Details" on page 76

Foundry Networks ServerIronXL Configuration

The following example shows the configuration requirements for a Foundry Networks ServerIronXL switch that was used for testing purposes in the Novell SuperLab. Other vendor products are similar when it comes to configuration and the parameters used. Refer to vendor documentation for further details.

```
ServerIron#sh run
Current configuration:
!
ver 07.3.03T12
no global-stp
global-protocol-vlan
!
server predictor round-robin
server sticky-age 2
server source-nat
server source-ip 151.155.184.107 255.255.252.0 151.155.187.254
!
server real r-ps-1 151.155.184.109
   source-nat
   port http
   port http keepalive
   port http url "HEAD /"
   port http status_code 100 499
   port ssl
   port ssl keepalive
!
server real r-ps-2 151.155.184.110
   source-nat
   port ssl
   port ssl keepalive
   port http
   port http keepalive
   port http url "HEAD /"
   port http status_code 100 499
!
server virtual ps-v1 151.155.184.108
   port ssl sticky
   port http sticky
   track-group http 443
   bind ssl r-ps-1 ssl r-ps-2 ssl
   bind http r-ps-1 http r-ps-2 http
!
vlan 1 name DEFAULT-VLAN by port
   no spanning-tree
!
boot sys fl sec
ip address 151.155.184.107 255.255.252.0
ip default-gateway 151.155.187.254
snmp-server community ..... rw
!
end
```

Summary of Configuration Settings

server source-ip: The IP address given to the L4 device.

server real r-ps-1: The IP address of server1. This server will be selected in Step 1 on page 76.

server real r-ps-2: The IP address of server2. This server will be selected in Step 1 on page 76.

server virtual ps-v1: The virtual IP address used to configure the L4 device in ZENworks Control Center. See Step 3 on page 76.

Configuring the Closest Server Default Rule

In addition to setting up and configuring the L4 switch, you need to also configure the Closest Server Default Rule. For more information, see "Setting Up Closest Server Rules" in the *ZENworks 10 Configuration Management System Administration Reference*.

Configuring an L4 Switch Definition from Selected Servers

1. In one of the role section listings, select the check boxes for one or more servers.
2. Click *L4 Switch* > *Create L4 Switch Definition from Selection*.
3. Specify an L4 switch definition name, then click *OK*.

   The L4 switch definition name must be either the DNS name or IP address of the L4 virtual server.
4. Click *Apply* to make the change effective.

Additional Details

- The created L4 switch definition is displayed in each of the listings, no matter where it is created, with the selected servers listed under each instance of the L4 switch definition.
- Servers can be members of multiple groups and L4 switch definitions.
- Servers that are members of an L4 switch definition or group are no longer listed at the top level of the server listing.

4.2.14 ZENworks Systems Update

The System Updates feature allows you to obtain updates to the Novell ZENworks 10 Configuration Management software on a timely basis, and also allows you to schedule automatic downloads of the updates.

Software updates are provided periodically and you can choose whether to deploy each update after viewing its content. After you have updated your zone and baselined it to version 10.3, it is recommended that you delete all other previous updates from the System Update page in ZENworks Control Center. The System Updates page must contains only updates for your existing version, and those regarding updating to a newer version of the product. Even if the system is baselined at 10.3, the Primary Servers calculate which Managed Devices need the updates listed, including older updates.

For more information, see "Introduction to ZENworks System Updates" in the *ZENworks 10 Configuration Management System Administration Reference*.

4.2.15 Content Management

The "content" in this guide is data that has been uploaded to the ZENworks zone for distribution to a managed endpoint. After the content is uploaded, it is encrypted and distributed to other Primary Servers and Satellite Content Servers in the zone. The ZENworks content repository is accessed by managed devices by using HTTP, a firewall-friendly protocol, allowing content to be provisioned to devices in any location, even outside of the corporate firewall.

A few examples of content include Windows Bundles, Patch Remediation data in ZENworks Patch Management, and ZENworks System Update content. After the content resides centrally on the Primary Servers of the zone, the next stage is to define which content belongs at which Satellite location and how to send the content to that location.

- "Defining the What in Content Management" on page 77
- "Organizing Bundles" on page 78
- "Defining the How in Content Management" on page 78
- "Critical Information Required To Determine Content Synchronization Settings" on page 80

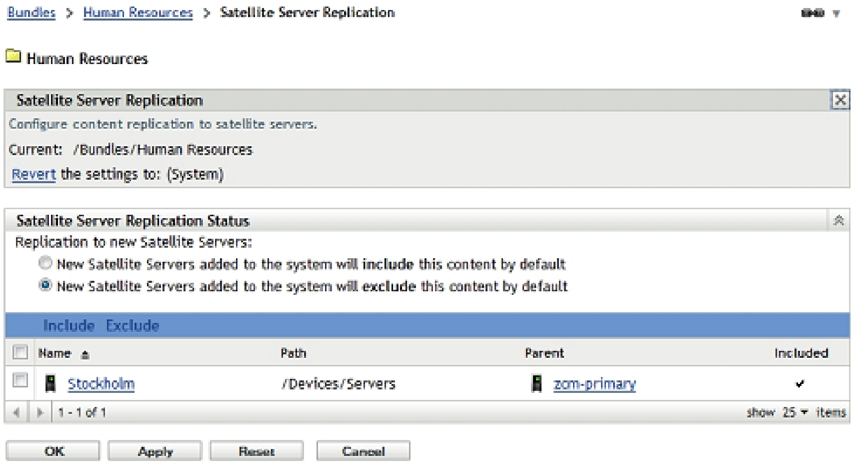
Defining the *What* in Content Management

An important improvement in Content Management is the ability to define content replication at the bundle-folder level. This ability provides several advantages over previous releases of ZENworks Configuration Management because it allows groups of applications or patches to be sent to sites with a few mouse clicks.

To define the Satellite devices to which the content located in the folder should be replicated, click the *Details* hyperlink of any bundle folder and click the *Settings* tab. If bundles are subsequently created in the folder, the content synchronization rules of the bundle folder are automatically applied.

In the following screen shot, all bundles in the *Human Resources* bundle folder are sent to the *Stockholm* remote office. A bundle created in the *Human Resources* bundle folder is automatically marked as *included* for the Stockholm location.

Figure 4-21 *Satellite Server Replication*



Bundles > Human Resources > Satellite Server Replication

Human Resources

Satellite Server Replication

Configure content replication to satellite servers.

Current: /Bundles/Human Resources

Revert the settings to: (System)

Satellite Server Replication Status

Replication to new Satellite Servers:

○ New Satellite Servers added to the system will include this content by default

● New Satellite Servers added to the system will exclude this content by default

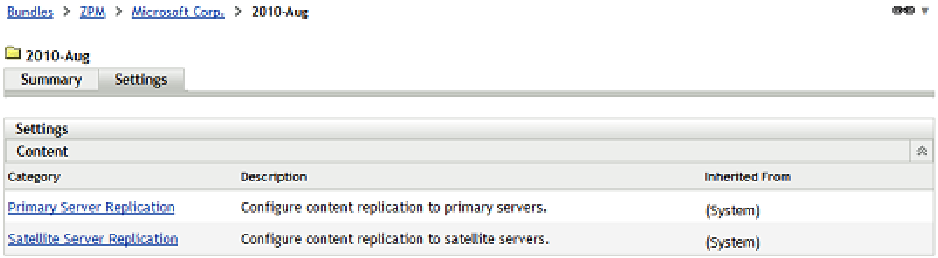
Include Exclude

□	Name	Path	Parent	Included
□	Stockholm	/Devices/Servers	zom-primary	✓

1 - 1 of 1 show 25 items

The technique of configuring content synchronization at the bundle-folder level is particularly useful when dealing with patches. As patches are stored in bundle folders organized by vendor, and then by month or year of release, groups of related patches can be sent to a given site in one operation. For example, automatically synchronizing all Microsoft patches for the previous month is extremely easy because this can be accomplished by configuring the relevant ZENworks Patch Management bundle folder, as displayed in the following screen shot:

Figure 4-22 *Bundle Folder Settings*



Bundles > ZPM > Microsoft Corp. > 2010-Aug

2010-Aug

Summary | Settings

Settings

Content

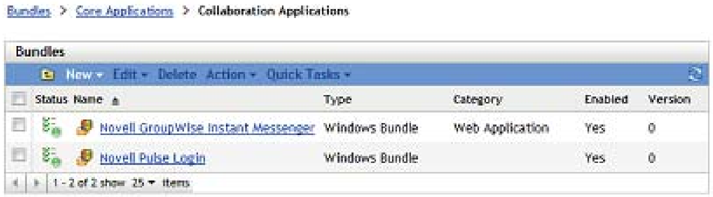
Category	Description	Inherited From
Primary Server Replication	Configure content replication to primary servers.	(System)
Satellite Server Replication	Configure content replication to satellite servers.	(System)

Organizing Bundles

Before considering content management, you should organize bundles into separate folders for ease of administration. Bundles can be grouped into folders by function, such as “Productivity Applications,” “Collaboration Applications,” or by business function, such as “Finance Applications” and “Human Resources Applications.” Introducing content control at the bundle-folder level means that the decision of how to organize bundles can also take into account the locations that the applications will be accessed from. For example, if a particular remote location has specific application needs unique to that site, consider creating a bundle folder for that location, thus allowing the content settings to be configured once for the core applications for that site.

If bundles are to be presented to users in the Windows *Start* menu, the default folder structure is a mirror of your bundle folder structure. For example, if the Novell Pulse Login bundle is associated with a user or device and instructed to be included in the *Start* menu, the Start Menu displays *Core Applications* > *Collaboration Applications* > *Novell Pulse Login*.

Figure 4-23 *Organizing Bundles*



Bundles > Core Applications > Collaboration Applications

Bundles

□	Status	Name	Type	Category	Enabled	Version
□		Novell GroupWise Instant Messenger	Windows Bundle	Web Application	Yes	0
□		Novell Pulse Login	Windows Bundle		Yes	0

1 - 2 of 2 show 25 items

This behavior can be overwritten in each bundle object, allowing the administrator to define for each bundle what the Windows Start menu structure should look like. This process can be cumbersome for each bundle; therefore you must consider the balance needs of content replication, ease of administration, and end-user presentation to decide about the folder structure for your bundle objects.

Defining the *How* in Content Management

ZENworks 10 Configuration Management SP3 introduces power mechanisms for granular control over what content should be hosted at specific locations. When you distribute content to Satellite locations, the concept of creating a *window of opportunity* for synchronization becomes very important. A *window of opportunity* involves the definition of window of time and the amount of bandwidth available to transfer a particular piece of content. In the previous versions of ZENworks Configuration Management, all content was treated the same way; however, in ZENworks 10 Configuration Management SP3, several content types are exposed in the ZENworks Control Center.

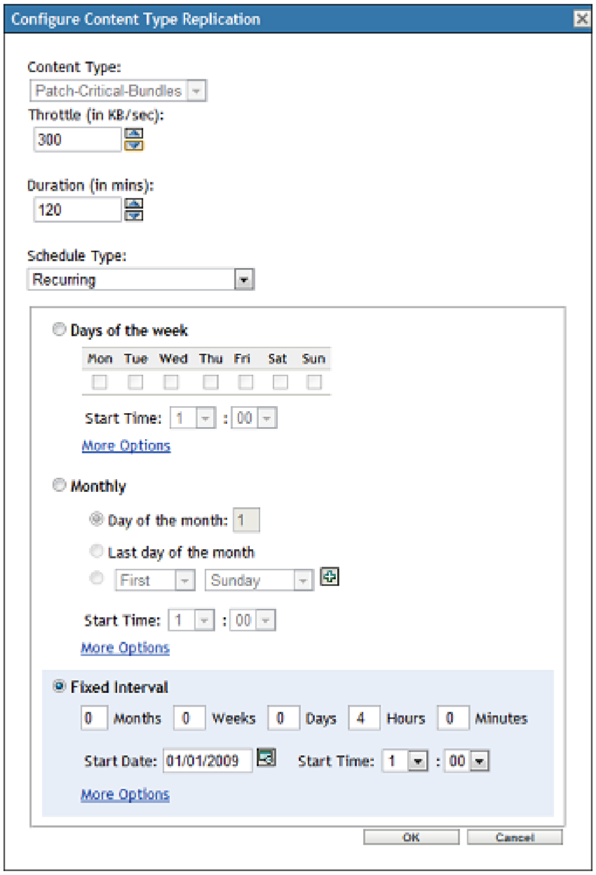
Table 4-2 *ZENworks 10 Configuration Management SP3 Content Types*

Content Type	Description
Imaging	Content that exists in the TFTP folder of a Primary server. Includes WIM content. **NOTE:** This content does not include ZENworks Image content.
Patch-Critical-Bundles	ZENworks Patch Management patches with the **Critical** status.
Patch-Information-Bundles	ZENworks Patch Management patches with the **Informational** status.
Patch-Recommended Bundles	ZENworks Patch Management patches with the **Recommended** status.
Patch-Software-Bundles	ZENworks Patch Management Software patches.
Patch-System-Bundles	ZENworks Patch Management patches with the **System Status**.
Policy	Any content associated with a ZENworks policy such as Printer policy or Group policy.
SystemUpdate-Agent	System update content for upgrading Satellite devices and managed endpoints.
Windows-Bundles	ZENworks Windows bundles created in the ZENworks Control Center, such as MSI bundles.

After you have defined *what* content should be available, the next stage is to define *how* and *when* it gets to the defined locations. For each content type, the administrator can specify the *window of opportunity* for synchronization, the recurrence period, and the bandwidth to be consumed during these operations. Administrators can now ensure that other services at remote sites are not affected by content delivery. If the *window of opportunity* and throttled bandwidth rate is not sufficient to completely synchronize all content, the process resumes from where it stopped when the *window of opportunity* opens again.

The following screen shot shows that Critical Security Patches have the opportunity to synchronize every 4 hours for up to 2 hours, consuming only 300 KB/s during the transfer.

Figure 4-24 *Content Type Replication Settings*



Configure Content Type Replication

Content Type: Patch-Critical-Bundles

Throttle (in KB/sec): 300

Duration (in mins): 120

Schedule Type: Recurring

○ Days of the week

Mon	Tue	Wed	Thu	Fri	Sat	Sun
□	□	□	□	□	□	□

Start Time: 1 : 00

More Options

○ Monthly

● Day of the month: 1

○ Last day of the month

○ First Sunday

Start Time: 1 : 00

More Options

● Fixed Interval

0 Months 0 Weeks 0 Days 4 Hours 0 Minutes

Start Date: 01/01/2009 Start Time: 1 : 00

More Options

In this scenario, the customer wants to ensure that critical security patches are available promptly but still wants to protect bandwidth at the same time. If the content to be synchronized takes only 10 minutes to complete, the *window of opportunity* closes after 10 minutes. If the transfer takes more than 2 hours, the remainder of the content is synchronized 2 hours later when the next *window of opportunity* opens, because of the 4-hour interval.

Critical Information Required To Determine Content Synchronization Settings

Before defining the content rules for a given location, you must collect the following information:

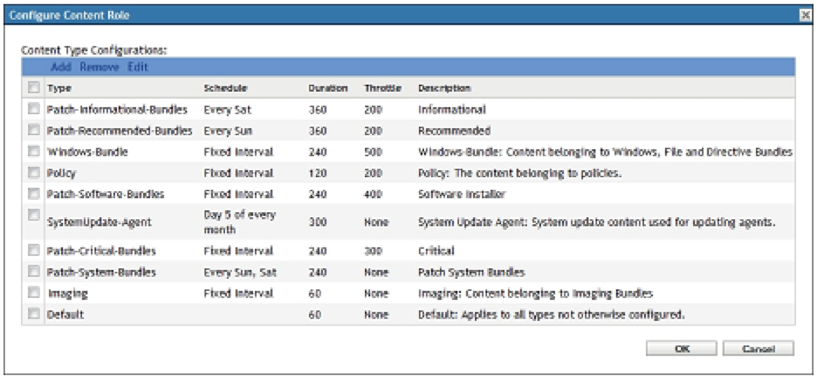
- The customer's content priority.

  For example, what should be available as soon as possible and what content can wait until after hours or perhaps weekend transfers.

- The network bandwidth available from the data center to each site and network utilization at each site. In some cases, a site might have a large data pipe but it might be subject to high utilization because of other applications and services that are running.

The following screen shot shows that each content type can be configured with its own *window of opportunity* so that it can accommodate any customer requirement.

Figure 4-25 *Content Type Configuration*



Content Type Configurations:

□	Type	Schedule	Duration	Throttle	Description
□	Patch-Informational-Bundles	Every Sat	360	200	Informational
□	Patch-Recommended-Bundles	Every Sun	360	200	Recommended
□	Windows-Bundle	Fixed Interval	240	500	Windows-Bundle: Content belonging to Windows, File and Directive Bundles
□	Policy	Fixed Interval	120	200	Policy: The content belonging to policies.
□	Patch-Software-Bundles	Fixed Interval	240	400	Software Installer
□	SystemUpdate-Agent	Day 5 of every month	300	None	System Update Agent: System update content used for updating agents.
□	Patch-Critical-Bundles	Fixed Interval	240	300	Critical
□	Patch-System-Bundles	Every Sun, Sat	240	None	Patch System Bundles
□	Imaging	Fixed Interval	60	None	Imaging: Content belonging to Imaging Bundles
□	Default		60	None	Default: Applies to all types not otherwise configured.

ZENworks Configuration Management offers the administrator significant flexibility in managing content synchronization, ensuring that content is always available at only the relevant locations, but more importantly that ZENworks does not consume all the bandwidth during this process.

4.2.16 Offline Content Replication and Management

ZENworks Configuration Management allows you to easily promote any managed device to a Satellite device with the roles of content repository, inventory and status collection point, imaging server, or an authentication point for local Active Directory or eDirectory instances. These roles are defined centrally in ZENworks Control Center and are applied automatically when the device next checks in.

Consider a situation where you need to launch a new site for management that is behind a very slow or saturated link. ZENworks can easily automate the delivery of content and throttle bandwidth to get the data needed to that location without adversely affecting other services hosted at that location. However, if the location needs GBs of application content, this process might take days or even weeks if small windows of opportunity and low-bandwidth throttles have been configured. If network providers charge customers on the basis of network utilization, sending large amount of content across WAN links should be avoided. ZENworks 10 Configuration Management SP3 provides the ability to export the content required by a Satellite device. Subsequently, the content can be transferred to a site through removable media, and imported into the content repository of the local Satellite. The process can save the customer unnecessary bandwidth consumption along with the associated time and financial costs.

The process for offline content synchronization is as follows:

1. Promote a managed device to be a Satellite device.
2. Assign the content role to the Satellite device.
3. Set the content synchronization schedule to *none*.
4. Specify the content that is needed at the location.
5. Export the content by using the zman command line utility with the Satellite Server Export Content option.

   ```
   C:\>mkdir \content
   ```

```
C:\>cd content
```

```
C:\content>zman ssec "Devices/Workstations/EMEA/novell-f7d8d036"
c:\content
```

The command looks up the content that is marked as *include* for a given Satellite that is currently not available, and exports the content to the defined location. If this is a new site, Step 3 and Step 4 ensure that this is all of the required content to launch the site.

6. Copy the content to a removable media and send it to the remote location.
7. After the data is available at the remote site, import it by using the zac command line utility with the Content Import option.

```
C:\>zac cic c:\tools\content -l:c:\content.log

Importing 125 items for content type Default...

Imported 125 items.

Successfully imported content (125 items).
```

8. After the content has been successfully imported, configure the content schedule and bandwidth throttling as is required for the site.

   After this process is complete, setting the content synchronization schedule instructs ZENworks to ensure all subsequent delta changes are automatically synchronized.

4.2.17 Satellite Authentication Role

Each Satellite Server in a ZENworks zone can be configured with one or more roles for managed devices.

Table 4-3 *Satellite Roles*

Role	Description	Available on a Satellite Device
Content	Provides access to the ZENworks content repository.	YES
Collection	Provides an upload point for inventory and endpoint status information.	YES
Imaging	Provides a PXE boot server for imaging jobs.	YES
Authentication	Provides a service where user credentials intercepted on the managed device can be passed to ZENworks. This allows for bundles and policies to be assigned based on the identity and role of the user.	YES
Configuration	Provides a service where configuration information such as bundles and policy assignments can be refreshed.	NO

As shown in Table 4-3, “Satellite Roles,” on page 82, a majority of roles can be hosted by a Satellite device. The ZENworks Authentication role was previously restricted to ZENworks Primary Servers; however, the role has been available on Satellite devices from ZENworks 10 Configuration Management SP3 or later. Configuring the Authentication role on a Satellite device allows for additional connections to be made to an eDirectory or Active Directory user source through a device that is local to the devices at a given location. For example, a customer using eDirectory will most likely create partitions dedicated to the resources for a given site and store a replica of the partition on a local server.

If a remote site has a local Directory server with LDAP enabled, a Satellite device can be configured with the Authentication role so that the authentication process can occur locally on the LAN. The authentication process is as follows:

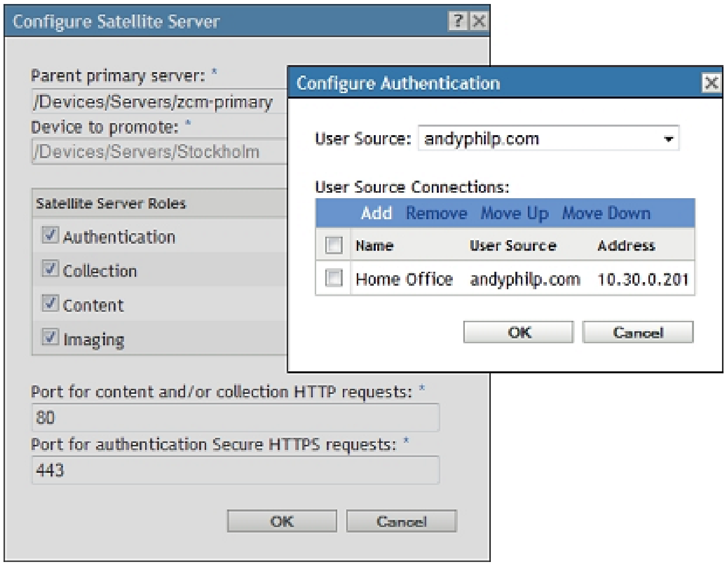
1. The user authenticates to eDirectory or Active Directory as part of the Windows logon process.
2. The credentials are intercepted and passed on to a ZENworks server hosting the Authentication role.
3. The Authentication Server searches for the user in the user source via LDAP(S). This information is used to determine what policy and bundles should be applied for users, based on their location in the directory and their group memberships.

The process of configuring local Satellite authentication is as follows:

1. Define an additional connection to the user source.
2. Assign the User Source Connection to the Satellite device.

The following screen shot shows an example of a Satellite Authentication role configured to connect to a local user source.

Figure 4-26 *Configuring the Authentication Role for a Satellite*



Configure Satellite Server

Parent primary server: *
/Devices/Servers/zcm-primary

Device to promote: *
/Devices/Servers/Stockholm

Satellite Server Roles

☑ Authentication
☑ Collection
☑ Content
☑ Imaging

Port for content and/or collection HTTP requests: *
80

Port for authentication Secure HTTPS requests: *
443

Configure Authentication

User Source: andyphilp.com

User Source Connections:

□	Name	User Source	Address
□	Home Office	andyphilp.com	10.30.0.201

User Authentication Load-Balancing

The creation of additional user source connections that can be applied to Primary Servers or Satellite devices offers additional load-balancing capabilities for the authentication process. ZENworks provides authentication load balancing at two levels:

1. Closest Server rules define the Authentication Server to which a managed device sends its credentials. Typically, there are multiple Authentication servers in a zone; therefore, the authentication process can spread across those servers through Closest Server rules.
2. User Source Connections instruct Primary Servers and Satellites of additional servers that can be used to perform the LDAP(S) user lookups. If there are multiple eDirectory or Active Directory servers in a given location, the authentication load can also be balanced across multiple LDAP servers.

When you make decisions on infrastructure placement to support ZENworks services, ensure that the load is spread across the ZENworks servers first and the customer's Directory servers second.

4.3 Lab Testing and Validation

One of the key parts of the design phase is the testing and validation that is done in the organization’s lab environment prior to any deployment being completed. This is your opportunity to do the following:

- Prove that the design and design decisions you made are accurate and correct, and meet the very specific requirements of the organization.
- Verify that software components are functioning properly, and that users are receiving the results that they should expect.
- Prove that the deployment will be successful.

The organization should use the lab to develop acceptance tests that are run by the project team and tracked for completion and success. The best way to do this is to document individual acceptance tests (a simple spreadsheet can be used if you want), and complete the tests according to the steps you need to take. After the individual tests have been run successfully and validated (proven successful), you can document this and move on until all tests have been completed.

If individual tests are unsuccessful, you need to make changes (this could also include your design), and run the test until it is successfully completed.

The idea is not to create more work for you, but to prove the overall design quality and increase the probability of a successful ZENworks Configuration Management deployment.

Your lab environment must reflect your existing infrastructure as closely as possible, and the ZENworks Configuration Management infrastructure in the lab must accurately reflect the design you are creating.

The lab should contain real-world layout (design) to ensure that the ZENworks Configuration Management design fits well within the existing environment. Things to include are:

- The design of directory services infrastructures, including Novell eDirectory and Microsoft Active Directory. If you can, replicate the directory services in the lab to ensure that the lab environment is isolated from the actual production systems. You want to avoid causing issues with the endpoints on the production network because of testing in the lab.

- Major network infrastructure components that need to be tested. This includes a replica of the main data center layouts, and the major classifications of remote sites that need to be tested for Satellite distributions and collections.
- An exact replica of the ZENworks Configuration Management infrastructure design that you are creating. This needs to be kept up-to-date. If any changes are made to the design, you need to immediately reflect these changes in the lab environment.
- You should test actual packages, content, collection, and so forth, and this needs to reflect the decisions made in the design phase. For example, you should test inventory collection based on the decisions you have made for inventory collection schedules. This is also true for all major components of ZENworks Configuration Management that are being deployed.
- You should perform all endpoint testing with actual base images that are being used in production. This includes a sample set of actual line-of-business applications and custom OS configurations.

  It is beneficial to have a sample set of departmental devices to use here. For example, use a typical workstation you would find in Accounting, Human Resources, Engineering, IT, and so forth.

When building your lab, you do not need to build the entire lab with physical hardware. You are not testing the breaking point here. You are testing functionality and whether or not there are any major issues found with the overall design. You should use actual production hardware to test functionality at the device level, but the server infrastructure could be virtualized to save hardware costs. The idea is to reflect the design so you can prove that it is solid.

4.4 Documentation

Documentation is the most important aspect of the design phase. It is critical that you document all decisions that are made during the design phase and keep these items up-to-date. After the document has been finalized, it is important to keep it up-to-date to reflect all changes to both the ZENworks Configuration Management infrastructure that is in place, as well as the infrastructure and services that ZENworks Configuration Management relies on.

In addition to reflecting the infrastructure, the design document can prove to be a useful and powerful knowledge transfer document. As individuals within the organization move in and out of the IT Services division, they can use this document to better understand what was put in place, and how the system is connected and interconnected. It is a tool to provide insight into what was decided during the project and beyond.

We recommend that you store the design document in a documentation repository if you have one, and you should provide access to the document as required. However, you should limit who has write access to the document so that it is not updated by unauthorized personnel.

Deploying ZENworks Configuration Management

5

Deployment is the final stage of the implementation of Novell ZENworks Configuration Management across your enterprise. If you have planned properly, and documented everything well during your assessment and design phases, this stage of the project should be simplified.

The following sections explain the steps you should take when deploying ZENworks Configuration Management across the entire infrastructure, and the steps should be followed closely regardless of the size of the organization.

5.1 Pre-Deployment Planning

The first step in the process of deployment is planning the actual deployment. The following are recommendations on how to plan this process:

- Contact departmental leaders and inform them about the deployment.
- Make suggestions on how you want to roll out the ZENworks Adaptive Agent to the endpoints, including which departments are going to be targeted by date and time. Make sure you line this up with your planned deployment schedule in your project plan. Ensuring that everyone knows that this is a deliverable of the organization makes it much easier to line up the departments, sites, or groups for deployment.
    - Identity and notify individuals that are part of the pilot phase of the deployment.
    - Emphasize that feedback is key to the success of this project. Individuals who are part of the pilot and more wider-scale deployment should provide feedback directly to the IT organization or to the Service Desk.
- Make sure your teams are well informed of the deployment. This includes:
    - Departmental leaders.
    - Employees of the organization.
    - The organization’s Service Desk (staff members should have the full documented schedule posted everywhere so everyone onsite knows what is going on, and when). This also includes everyone involved in Incident and Problem Management processes.
    - The entire IT department, including desktop support, network services, and other operational groups.

- Change Management.
- Security services groups, they need to be well informed that this is a planned organizational initiative.

5.2 Pre-Deployment Documentation

Documentation is key to the success of every aspect of the project, including how you plan to deploy the services and agents. Everyone directly involved in the actual deployment, should have documentation that they can reference at all times, eliminating the chance of error.

Documentation regarding the deployment processes needs to be completed during the design phase, and while you are testing the deployment in your test lab facilities. After you have proven the concept and included deployment activities in the design document, you should create a Deployment Assistance Guide that can be used by the individuals who are involved. You might not need to share the entire design document with everyone involved in the deployment of the product. Use your best judgment here.

5.3 Deployment Rules of Thumb

The following scenarios depict the rules of thumb to be followed for deploying ZENworks 10 Configuration Management SP3:

- Section 5.3.1, "Scenario 1: One Major Location with 1, 500 Devices," on page 88
- Section 5.3.2, "Scenario 2: One Major Location with Several Remote Locations and More Than 1,500 Devices," on page 88

5.3.1 Scenario 1: One Major Location with 1, 500 Devices

Consider a scenario consisting of only one major location with 1,500 devices. To deploy ZENworks Configuration Management in this scenario, you should consider two Primary Servers to provide fault tolerance and load balancing, and any of the supported databases. Even though Sybase is sufficient for your requirements, you can choose Microsoft SQL Server or Oracle, especially if growth is a future consideration.

In this scenario, there is no need for Satellite servers but you must carefully monitor the overall system performance and add Primary Servers, if necessary.

5.3.2 Scenario 2: One Major Location with Several Remote Locations and More Than 1,500 Devices

Consider a scenario consisting of one major location, several remote locations, and more than 1,500 devices. To deploy ZENworks Configuration Management in this scenario, you must consider the following:

- A minimum of three Primary Servers. You must plan to initially deploy three Primary Servers to provide a robust core infrastructure. If necessary, you can scale it back at a later time.

- Enterprise-ready database infrastructure, based on either Microsoft SQL Server or Oracle.
- Satellite Servers deployed to remote sites. Based on the size of the sites and Satellite roles, you can host the Satellite services on server class or workstation class devices. If User Sources are used, it is recommended to enable and configure the Authentication Role at the Satellite Server and have the server point to a local replica or domain for user and group object information.

5.4 Pre-Deployment Testing

We recommend that you set aside some time before you perform your pilots to further prove your deployment by running some last-minute tests. Allow enough time so that any adjustments can be made and documented prior to deployment.

Perform the test in your lab facilities, using three or four sample workstations with a sample of line-of-business applications installed. This can be a replica of tests done during your full testing phase.

5.5 Pilots

The first phase of the actual deployment is the pilots. This is where you deploy the ZENworks Adaptive Agent to those members that you identified and notified as part of the pilot phase. You are looking for feedback from these individuals, and this can be done through a feedback form, e-mail, or face-to-face meetings.

Do not perform the pilots all at once. Use a rolling approach to this phase. If something goes wrong with the deployment, you want to limit the number of people that are impacted. After you are confident that the deployment is going as planned, you can increase the number of devices you deploy to.

5.6 Migration

If your deployment involves a migration from an existing ZENworks infrastructure, you should have gone through a pre-staging process (see Section Appendix 6, “Deployment and Migration Scenarios,” on page 93 for further details), but your actual process for deploying to the end-user communities should not be different. You still need to pilot and deploy in the same way as if this is a new deployment of ZENworks Configuration Management.

You should use the ZENworks Migration Wizard to perform the pre-staging activities, which includes migration of the following resources:

- Application objects and source content. This includes all AOT/AXT-based objects and content, MSI-based objects and content, and Simple objects.
- Image objects and image files.
- Policy objects and applicable policy files (for example, Group Policy files).
- Imported workstation objects.
- All associations for application objects and policy packages.

The Migration Wizard can be found at the following locations:

```
%zenworks_home%\install\downloads\tools
https://servername-zenworks-setup/zenworks-setup/?pageId=tools
```

It is important to note that if you are migrating from an eDirectory infrastructure (for user sources) to an Active Directory environment, you should take advantage of the migration capabilities built into the Migration Wizard for migrating associations. This allows you to migrate your existing eDirectory associations to Active Directory users, groups, and folders.

In addition, if you are migrating workstation objects, the wizard allows you to avoid the need for discovery of devices. After you have migrated your workstation objects into the ZENworks Configuration Management Zone, you can target them directly from there. In fact, we recommend that all existing ZENworks customers migrate their workstation objects even if they are associating applications and policies only to users in the user source. If workstations are not migrated, and you deploy the ZENworks Adaptive Agent to the existing ZENworks workstations, all applications and policies within ZENworks Configuration Management redeploy.

For more information about the Migration Wizard, see the *ZENworks 10 Configuration Management ZENworks Migration Guide*.

Some additional best practice recommendations for using the Migration Wizard include:

- If you migrate traditional ZENworks application objects as MSI files through the Migration Utility running on a Windows Vista device, the performance might degrade. For improved performance, run the Migration Utility on a Windows XP SP2 device.
- While migrating applications that require the content to be uploaded to the content server, the migration might fail. Ensure that the port specified in the *File Upload Http Port* option while logging in to the migration destination zone matches the port configured while installing the ZENworks Configuration Management Server.
- While migrating large applications that should be uploaded to the content server, the connection to the server might be lost, resulting in failure of the migration. Ensure that the *Get response timeout* option in the Web Client Configuration is set to *None* in order to establish a persistent connection with the server.
- While migrating applications, deselect the *Upload to content server* option if you do not want to upload the applications to the content server. Deselecting the option migrates the MSI applications as Install Network MSI, which installs the MSI from a network path. By default, the *Upload to content server* option is enabled.
- If you use the Snapshot Manager in traditional ZENworks to create complex application objects with multiple changes such as Registry, INI, and File Copy, you should migrate the applications as MSI by disabling the *Migrate distribution options as individual actions* option.
- If you use the Snapshot Manager in traditional ZENworks to create application objects with single changes such as Registry, INI, or File Copy, or if the application object must be edited later, you should migrate the application as actions by enabling the *Migrate distribution options as individual actions* option.
- If an application is dependent on other applications, review the applications on which the dependency exists and migrate them as MSI or as actions dependent on the requirements, then migrate the dependent applications.
- If the traditional ZENworks application objects use files that are hosted on the network share, you should map the network share on the device hosting the migration tool.
- By default, the applications are uploaded to the content server during the migration. If the application files are located on a shared network and you want to continue using the network files, deselect the *Upload to content server* option.

- If there are too many associations to be listed in the Migration Utility, select the *Either eligible or ineligible for migration (No warning)* option to reduce the time taken by the utility in listing the associations.
- Application objects that have the AppFsRights attribute set in eDirectory are not listed in the Migration Utility. To list such applications for the migration, remove the AppFsRights attribute. For more information on removing attributes, search for the LDAP Attribute Remover article at the ZENworks Cool Solutions Community (http://www.novell.com/communities/coolsolutions/zenworks).

5.7 Wider Deployment

After you have completed the pilot deployments, you can move on to a wider deployment. Continuing to use the deployment plan that you have documented. You should execute against your project plan until you have completed the rollout to all remaining workstations on your network. See Appendix 6, "Deployment and Migration Scenarios," on page 93 for further details on how to do this, depending on the type of deployment you are performing.

5.8 Post-Deployment Documentation and Validation

After you have completed the deployment, you should document all steps you took to deploy across your entire infrastructure. We recommend that you do this outside of the project plan, and include this in your documentation repository as either a separate document or as a part of your existing design document.

In addition, you should validate your success as much as possible. This can be done by doing the following:

- Perform physical spot checks wherever you can. Interview individuals briefly to see if they are experiencing any issues with the deployment, and more specifically with the addition of the ZENworks Adaptive Agent.
- Review error logs in ZENworks Control Center and investigate further from there. Visit workstations to find out more details if necessary.
- Monitor Service Desk activity throughout the duration of the deployment phase. Service Desk incidents reveal a lot of information. You are looking for spikes in activity and the details of the individual Service Desk requests.

Deployment and Migration Scenarios

6

The following section describes various deployment and migration scenarios and the suggested steps for implementing Novell ZENworks Configuration Management:

- Section 6.1, "New ZENworks Customer," on page 93
- Section 6.2, "Migrating From a Previous Version of ZENworks," on page 99

6.1 New ZENworks Customer

This scenario is this simplest deployment to plan. Because an existing ZENworks implementation is not in place, the pace of the deployment can be controlled vary carefully without coordinating the decommissioning of previous ZENworks services. In this scenario, the administrators have only one administration tool to utilize: the ZENworks Control Center. This simplifies the administrative effort.

When deploying ZENworks Configuration Management to a new customer, Novell recommends that you consider the following steps:

- Section 6.1.1, "Build a Model Office Environment," on page 93
- Section 6.1.2, "Planning," on page 95
- Section 6.1.3, "Deployment," on page 97

6.1.1 Build a Model Office Environment

It is important that the desired solution is tested in an environment that accurately represents the customer's environment. If a test or model office environment can be built, the ZENworks Adaptive Agent should be deployed to test devices that accurately reflect the various builds that are in the field. Customers often have multiple operating system builds with different service packs, authentication mechanisms, and standard applications. Ensuring that the desired configuration works on all of these builds helps to ensure a successful deployment to the live environment.

Another benefit of providing a model office environment is that groups of end users can be invited to use the systems and provide feedback on how information and data is presented. A good example of this is the various methods for presenting application icons to the end-users. In some cases, users might prefer to use the Start Menu, Quick Launch Toolbar, or the ZENworks Application Window. Gathering feedback on these items early allows careful planning for how to best provide ZENworks Configuration Management functionality to the end users.

- "Discovery and Deployment Methods" on page 94
- "Deploy and Test Policies" on page 94
- "Deploy and Test Applications" on page 94
- "User Acceptance Testing" on page 95

Discovery and Deployment Methods

A new ZENworks customer might not have a desktop management solution already in place. In this scenario, the customer needs to try various methods for deploying the ZENworks Adaptive Agent to new machines. ZENworks Configuration Management provides the ability to discover devices via IP or LDAP discovery routines and then to target remote deployments of the agent to these discovery devices. For remote agent deployment to function a number of criteria must be in place, such as:

- Simple File Sharing is disabled
- An administrative credential must be provided

If it is not possible to deploy devices via the built-in deployment tool, a number of other methods can be investigated. For each of the following methods, the process should be tested to ensure that the process is acceptable to the end user and that the ZENworks Adaptive Agent can be successfully deployed.

- "Login Scripts" on page 94
- "Manual Agent Download" on page 94

Login Scripts

If the customer utilizes a directory, the Adaptive Agent can be deployed through login scripts.

NOTE: The end user must have the necessary privileges to install the Adaptive Agent.

Manual Agent Download

The last resort for agent deployment is to manually download the agent from the ZENworks Control Center. Alternatively, customers can place the agent installation on their own intranet pages to allow users to install the product.

Deploy and Test Policies

After the ZENworks Adaptive Agents are deployed in the model office environment, the ZENworks policies can be tested to ensure that the desired result is achieved. Particular attention might be directed to the deployment of Group Policies. Group Policies in ZENworks Configuration Management are plural, allowing multiple policies to be stacked. It is important that the different policy stacks are tested.

Deploy and Test Applications

Test all applications that are to be made available on the first day of the production rollout. This testing should include:

- "Standard Applications" on page 95
- "Line of Business Applications " on page 95
- "Specialized Applications" on page 95

Standard Applications

These applications are made available to all managed devices. Typical examples of these are the following:

- Adobe Reader
- OpenOffice
- GroupWise e-mail client
- GroupWise Instant Messenger

Line of Business Applications

Different departments within the organization, such as Finance and Human Resources, might require different application sets. Ensure that these applications deploy successfully on each build type and that they interact with other applications.

Specialized Applications

Applications that are used by a very small numbers of users should also be tested; for example, applications designed for people with disabilities.

User Acceptance Testing

After the ZENworks Adaptive Agent has been deployed and all policies and applications have been tested for functionality, the next phase involves inviting representatives of the user base to test the end-user experience. At this stage, it is valuable to receive feedback on a number of items such as:

- The look and feel of the desktop
- The method by which users can launch ZENworks Configuration Management delivered applications (Start Menu, Quick Launch bar, notification area, and so forth)

Feedback received from users helps to ensure that the ZENworks-delivered desktop experience is acceptable. Another useful result of this activity is that requirements for additional training or marketing collateral is identified.

6.1.2 Planning

Planning deployments are an important part of a successful project. After a robust design has been tested and evaluated in a model office environment, a number of steps should be followed before implementing ZENworks Configuration Management in a production environment.

- "Identify Groups of Users and Devices" on page 95
- "Create Internal Documentation" on page 96
- "Schedule Deployments" on page 97

Identify Groups of Users and Devices

An important part of any deployment is to identify which devices will be targeted and in which order. Novell recommends that logical groupings be made in the target environment before deploying the product. After ZENworks Adaptive Agents are deployed and represented in the

ZENworks Control Center as managed objects, ZENworks groups can be created to reflect these groups. Groups can become important in the future when staging the rollout of system updates, applications, and patches.

The following list provides examples of how environments can be grouped:

- **Departments:** The IT organization is a good group of people to start with because the members tend to be technology-savvy and understand the needs for reboots and testing.
- **Laptop Users:** Laptop users are a good group to identify to test the roaming capabilities of ZENworks Configuration Management. As devices roam inside the firewall, it is important that Closest Server Rules are configured in the Management Zone to ensure that devices connect to the most appropriate servers based on their physical location.
- **Home workers and VPN users:** These devices connect to the corporate firewall in a non-standard way. Testing these devices early ensures that the logon and connection process works to connect to the ZENworks Management Zone and refresh content.
- **Geographical locations:** You should establish a footprint at each major location early. This is to ensure that the Management Zone is configured correctly to spread the load of devices via Closest Server Rules.
- **VIP users:** You might want to manage the devices of C*x*Os and IT directors early, so you are able to ensure that they are working well. It is often beneficial to create a workstation group to group important devices together. This allows for remedial actions to be quickly taken.

Create Internal Documentation

Internal documents that can be shared with the end user are an important part of any project that introduces technology that affects the desktop experience.

The following sections describe internal documentation that you could use:

- "Internal Marketing Collateral" on page 96
- "Support and Issue Escalation Process Documents" on page 96

Internal Marketing Collateral

Internal marketing is an important tool to inform end users of IT projects that affect them. This normally comes in the form of intranet postings, internal promotions, posters, and so forth. Novell recommends that customers are encouraged to use these actions to ensure that the deployment process is managed effectively.

Support and Issue Escalation Process Documents

When introducing a new product into a customer environment, it is important that the customer's support escalation process is well defined. In addition to this, it is vital that the support organization is well trained on ZENworks Configuration Management. Key members of the support team should attend workshops and training early in the project to ensure that they are familiar with the product, the configuration, and troubleshooting methods. After key members are trained, this knowledge can be cascaded to the other members of the team as it is needed.

Schedule Deployments

After the deployment groups have been defined, the next stage is to schedule when the deployments occur for each group within the organization. This process is typically associated with the process of raising change control requests. Novell recommends that deployments be scheduled in small groups to begin with and then ramped up over time to ensure that the ZENworks Configuration Management architecture can be monitored effectively during peak periods of change.

6.1.3 Deployment

Deploying ZENworks Configuration Management to managed devices is the most important part of any ZENworks project, this is the stage at which end-users' productivity can become affected. Novell recommends using the following basic steps when deploying the product to a new environment:

- "Deploy the First ZENworks Primary Server and Database" on page 97
- "Deploy Initial Managed Devices" on page 98
- "Extend the Architecture" on page 98
- "Extend the Managed Device Footprint" on page 98
- "Analyze, Review, and Plan" on page 98

Deploy the First ZENworks Primary Server and Database

Deploy the first ZENworks Primary Server and database and ensure that the Management Zone is stable.

The first server in the Management Zone is often the Certificate Authority for the rest of the Zone. It should be carefully managed and backed up regularly.

After the Management Zone is functional, the initial configuration should be defined as follows:

1. Create workstation folders, depending on how the customer wants to organize devices, such as departments, geographical locations, and project teams. For more information, see "Creating a Folder" in the *ZENworks 10 Configuration Management Administration Quick Start*.
2. Create registration rules and keys to control the placement of devices in the Management Zone. For more information, see "Registering Devices" in the *ZENworks 10 Configuration Management Administration Quick Start*.
3. Create roles and assign administration rights. If a user source is being used, configure existing users with the management rights necessary for their role. For more information, see "Administrators" in the *ZENworks 10 Configuration Management System Administration Reference*.
4. Configure Closest Server Rules. Ensure that the various network locations are reflected. For more information, see "Setting Up Closest Server Rules" in the *ZENworks 10 Configuration Management System Administration Reference*.
5. Configure System Update. Ensure that the server can access the various Internet resources required to download system updates and product recognition updates. For more information, see "Introduction to ZENworks System Updates" in the *ZENworks 10 Configuration Management System Administration Reference*

6. Configure user sources. Configure the link to the chosen user source and ensure that the user objects can be found by browsing the source. For more information, see "User Sources" in the *ZENworks 10 Configuration Management System Administration Reference*.
7. Configure Inventory scheduling. The default setting for all devices is to inventory monthly on the first day of each month. Create different schedules for each of the workstation folders that exist within the Management Zone. For more information, see the *ZENworks 10 Configuration Management Asset Inventory Reference*.
8. Create standard policies, such as Remote Control policies. For more information, see "Creating Policies" in the *ZENworks 10 Configuration Management Policy Management Reference*.
9. Create the required application bundles. When using a staged approach, it is necessary to create only the standard bundles and the applications that are required by the first device stages. For more information, see "Creating Bundles" in the *ZENworks 10 Configuration Management Software Distribution Reference*.

Deploy Initial Managed Devices

Using the chosen deployment methods, deploy the first stages of devices to the Management Zone. After the devices have been deployed, ensure the following:

- Devices are in the correct location (`Workstation` folder).
- Devices have successfully created and uploaded inventory data.
- Devices can be remotely controlled.
- ZENworks Primary Servers and the ZENworks Database are stable.
- Devices can be refreshed successfully and do not report errors.

After the customer is satisfied that the initial Management Zone configuration is stable with the first stages of devices, the project can continue.

Extend the Architecture

According to the recommendations in this document, add additional Primary Servers and Satellite devices. If possible, make sure all servers are in place before introducing additional devices. This provides the opportunity for the servers to be patched appropriately and for the Content Repository to synchronize completely. If all of the servers cannot be deployed before the live devices are added, ensure that the deployment is staged in such as way that the servers are added before the relevant groups of devices are added.

Extend the Managed Device Footprint

Using the stages identified earlier, continue the managed device rollout in a staged fashion to the rest of the organization.

Analyze, Review, and Plan

During the device rollout, it is vital that the performance of the back-end servers, databases, and managed devices are closely monitored using tools such as Perfmon. The following items should be closely monitored:

- Disk utilization

- Memory
- Peak processor utilization

If servers are highly utilized and struggling to cope with the load placed on them by the managed devices, it is necessary to review the Management Zone configuration and the number of Primary Servers and Satellite devices.

6.2 Migrating From a Previous Version of ZENworks

In addition to the topics described in the previous section, a number of key factors should be taken into consideration when migrating from a previous version of ZENworks to ZENworks Configuration Management.:

- Section 6.2.1, “Application Deployment Strategy,” on page 99
- Section 6.2.2, “Application and Policy Migration,” on page 100
- Section 6.2.3, “Novell eDirectory ,” on page 100
- Section 6.2.4, “Repurpose Hardware Used by Previous Zenworks Products,” on page 100

6.2.1 Application Deployment Strategy

If a customer already has a mature deployment of ZENworks Desktop Management, it is likely that the customer manages an extensive application repository. In many cases, the customer is using the Tiered Electronic Distribution component of ZENworks Server Management to tightly manage the distribution of application software code to the file servers needed to support deployment to end-users. In addition to these components, the customer might have already invested in processes and work flows to facilitate application delivery, and therefore might be reluctant to start again with a new system.

ZENworks Configuration Management provides an encrypted data store, known as the Content Repository, that stores delivery content for applications, patch remediations, and ZENworks system updates. When creating an application bundle, the delivery content is uploaded to the Management Zone, encrypted, and subsequently synchronized to all ZENworks Primary Servers. This process allows for applications to be delivered securely to devices using HTTP, regardless of the device's physical location.

However, it is possible to create application bundles that refer to application repositories that are external to ZENworks. For example, a customer might want to deliver applications with ZENworks Configuration Management but refer to the same application content (MSIs) that ZENworks Desktop Management is pointing to. The advantages of this approach are as follows:

- Existing repositories can be used.
- Existing processes for application management can be used. If a customer has invested in this heavily, this is a compelling case to use the existing methods.

Some disadvantages of the approach are as follows:

- The management of content is controlled outside of ZENworks Configuration Management. Where the files reside and the rights users have to these locations must be managed outside of the ZENworks Configuration Management management tools.

- Using standard file and print delivery mechanisms restricts content deliver to devices inside the firewall.

  With the ZENworks Content Repository, devices download content though HTTP. This allows content to be made available to external users via a Primary Server location in the DMZ.

6.2.2 Application and Policy Migration

ZENworks Configuration Management ships with a migration utility designed to migrate applications, policies, and associations from a ZENworks Desktop Management system to ZENworks Configuration Management. When applications are migrated to ZENworks Configuration Management by using this tool, the data for the applications is automatically placed in the Content Repository. If a customer wants to use existing application repositories, the migration tool should not be used for their applications.

For more information on the migration tool, see the *ZENworks 10 Configuration Management ZENworks Migration Guide*.

6.2.3 Novell eDirectory

If your organization's preferred server and directory platforms are Windows Server and Active Directory, and you're currently using ZENworks middle tier architecture and Identity Manager directory sync, ZENworks Configuration Management makes it possible to eliminate both of these stepping-stone technologies and interact directly with Active Directory for user authentication and content association. This can be performed as simply as configuring the ZENworks Configuration Management Zone to point directly at Active Directory as a user source.

6.2.4 Repurpose Hardware Used by Previous Zenworks Products

Customers commonly want to reuse hardware when possible. If a customer is migrating from previous ZENworks technologies such as ZENworks Patch Management, ZENworks Asset Management, eDirectory, and ZENworks Desktop Management, the hardware utilized for this functionality can be re-purposed.

In some instances, it might be beneficial to reuse the hardware to provide the additional ZENworks Primary Servers and ZENworks Satellite devices that are required by the migration project. Planning the reprovisioning of hardware is an important step in a migration project and can help reduce the architecture costs for the ZENworks Configuration Management deployment.

ZENworks Services

A

This section explains some of the Novell ZENworks Configuration Management services in greater detail, and also provides some useful information regarding logging, backing up, and restoring the Certificate Authority.

A.1 ZENworks Services

On a Windows ZENworks Primary Server, the services reside in the `\novell\zenworks\bin` directory. On a Linux ZENworks Primary Server, they reside in the `/etc/init.d` directory.

A.1.1 Checking the Status of a ZENworks Service

1. At the server command prompt, enter the following command:

```
/etc/init.d/servicename status
```

Replace *servicename* with the name of the service as listed in Section A.1.5, “ZENworks Services,” on page 102.

A.1.2 Starting a ZENworks Service

To start a ZENworks service on a Windows ZENworks Primary Server:

1. Click *Start* > *Administrative Tools* > *Services*.
2. Select the service you want to start, then click *Start*.

To start a ZENworks service on a Linux ZENworks Primary Server:

1. Enter the following command at the server console prompt:

```
/etc/init.d/servicename start
```

Replace *servicename* with the name of the service as listed in Section A.1.5, "ZENworks Services," on page 102.

To start all services:

1 Enter the following command at the server console prompt:

```
/opt/novell/zenworks/bin/novell-zenworks-configure -c Start
```

A.1.3 Stopping a ZENworks Service

To stop a ZENworks service on a Windows Primary Server:

1 Click *Start* > *Administrative Tools* > *Services*.

2 Select the service you want to stop, then click *Stop*.

To stop a ZENworks service on a Linux ZENworks Primary Server:

1 Enter the following command at the server console prompt:

```
/etc/init.d/servicename stop
```

Replace *servicename* with the name of the service as listed in Section A.1.5, "ZENworks Services," on page 102.

A.1.4 Restarting a ZENworks Service

To restart a service that is already running on a Windows Primary Server:

1 Click *Start* > *Administrative Tools* > *Services*.

2 Select the service you want to start, then click *Restart*.

To restart a service that is already running on a Linux Primary Server:

1 Enter the following command at the server console prompt:

```
/etc/init.d/servicename restart
```

Replace *servicename* with the name of the service as listed in Section A.1.5, "ZENworks Services," on page 102.

A.1.5 ZENworks Services

Table A-1 *ZENworks Services, Service Names, and Descriptions*

Service	Service Name	Description
Proxy DHCP Service	novell-proxydhcp	Used with a standard DHCP server to inform PXE-enabled devices of the IP address of the Novell TFTP server.
TFTP Service	novell-tftp	Used by PXE-enabled devices to request files that are needed to perform imaging tasks.

Service	Service Name	Description
ZENworks Agent Service	zenworkswindowsservice novell-zmd	Used to enable the server as a managed device.
ZENworks Datastore	dbsrv10	Embedded database used for storing ZENworks objects and resources.
ZENworks Loader	zenloader	Used for loading and controlling the Java services that perform ZENworks Server tasks.
ZENworks Preboot Policy Service	novell-zmgprebootpolicy	Used by PXE-enabled devices to check for assigned preboot policies and work.
ZENworks Preboot Service	novell-pbserv	Used to provide imaging services to a device. This includes sending and receiving image files, discovering assigned Preboot bundles, acting as session master for multicast imaging, and so forth.
ZENworks Remote Management	nzrwinvnc	Used to enable remote management of the server.
ZENworks Server	zenserver	Used for communicating with the ZENworks Agent.
ZENworks Services Monitor	zenwatch	Used to monitor the status of the ZENworks services.
ZENworks Imaging Agent	ziswin	Used to save and restore image-safe data on the server (as a managed device). Only runs when launched by the ZENworks Agent.

A.1.6 Web Services Test Pages

Most web services on the Primary Server provide details regarding the services, and can be used for test purposes after the servers have been installed. This ensures that the services are up and running prior to any deployment of the Adaptive Agent into the infrastructure, and there are no problems with the services themselves.

The three common interfaces are:

- https://*Primary_Server_IP_address_or_FQDN*/zenworks-useradmin
- https://*Primary_Server_IP_address_or_FQDN*/zenworks-coreadmin
- https://*Primary_Server_IP_address_or_FQDN*/zenworks-ping

A.1.7 Agent Log Files

The following log files help that are available at the device level help you to troubleshoot issues pertaining to managed devices:

- `zmd-messages.log` - Contains logging information of the agent.
- `nwgina.log` - Contains information related to GINA startup and login.
- `zenlgn.log` - Contains information regarding the login process.

- `casaauthtoken.log` - Contains information regarding CASA connection to the CASA servlet.
- `nalshell.txt` - Contains information related to the ZENworks Explorer shell extension.
- `system-update.log` - Contains information regarding the progress and errors related to installing a System Update.

A.1.8 Server Log Files

The following log files help that are available for Primary Servers help you to troubleshoot issues pertaining to server activities.

- `services-messages.log` - Contains messages from all of the ZENworks servlets.
- `loader-messages.log` - Contains messages from all registered ZENworks loader modules and the queue (important).
- `ats.log` - Contains information related to CASA connections to the agent and to the LDAP user source.
- `zcc.log` - Contains output information from the ZENworks Control Center servlet. It helps you to troubleshoot issues that might occur while working in ZENworks Control Center.
- `catalina.out` - Tomcat logs.

A.2 Useful URLs

- Section A.2.1, "Discovery," on page 104
- Section A.2.2, "Deployment," on page 104

A.2.1 Discovery

`https://`*`Primary_Server`*`/zenworks-discovery`

`https://`*`Primary_Server`*`/zenworks-discoveryadmin`

`https://`*`Primary_Server`*`/zenworks-fileupload`

A.2.2 Deployment

`https://`*`Primary_Server`*`/zenworks-deployment`

`https://`*`Primary_Server`*`/zenworks-deploymentadmin`

`https://`*`Primary_Server`*`/zenworks-downloads`

A.3 Critical File Locations

ZENworks Configuration Management uses the following directories:

- Section A.3.1, "Installation Directories," on page 105
- Section A.3.2, "The ZENworks Content Repository," on page 105

A.3.1 Installation Directories

ZENworks Configuration Management uses the installation directories listed here. It is important to keep this in mind and be aware of where ZENworks Configuration Management is storing files. This is useful when you are troubleshooting specific functionality in ZENworks Configuration Management:

Windows installation directories:

- `Installation_directory`/ZENWORKS

Linux Installation directories:

- `/opt/novell/zenworks/`
- `/etc/opt/novell/zenworks`
- `/var/opt/novell/zenworks`
- `/var/opt/novell/log/zenworks/`

For best performance, you should use separated disks and logical drives for the OS and the installation directory. In addition, the database (if it is embedded) and log file size can increase very quickly, so it is better to have them on separate partitions.

A.3.2 The ZENworks Content Repository

The content repository is found in the following location on a Windows server:

`installation_path\zenworks\work\content-repo`

You should specify a different disk drive to be your content repository. This is based on best practices that Novell outlines for ZENworks Configuration Management. In Windows, this is done by mounting the drive. Mounting is simply pointing an existing path to a hard drive partition without the use of mapped drive letters.

In the following steps, you mount the default content repository location to a disk drive partition, which becomes the new content repository:

1. Make sure that the disk drive you want to use is attached to the server and is properly formatted as NTFS. This disk drive can be an existing drive or new drive for the machine. The hardware must be recognized by the server. However, do not specify a drive letter if you are adding a new disk drive to the machine. Windows does not allow mounting to a drive letter.
2. Because an empty `content-repo` directory must exist in the default location (`installation_path\zenworks\work\content-repo`) to be the pointer to the new Content Repository location, do one of the following to make sure that there is no content in the default location:
    - If you need to save the content that is now in this directory, rename the existing directory and create a new directory named `content-repo`.

      You can then copy the content from this renamed directory to the new Content Repository location.

- If you do not need any of the content in the existing `content-repo` directory, delete the directory and re-create it.
- If the `content-repo` directory is not present in the path given above, create the path and directory.

3. Click *Start*, right-click the *My Computer* icon, then click *Manage*.

   You can also click *Start*, then enter `compmgmt.msc` at the Run command line.

4. Select *Disk Management* under the *Storage* section in the left pane.

   The disk drive you selected during the beginning of these steps should be displayed in the right pane.

5. (Conditional) If a driver letter is associated with the partition that you want to use as the new content repository location, do the following:

   5a In the Computer Management dialog box, right-click the drive's partition.

   5b Select *Change Drive Letter and Paths*.

   5c Select the drive letter.

   5d Click *Remove*, then click *Yes* to confirm.

6. Right-click the partition of the disk drive that you want to use as your content repository, then click *Change Driver Letter and Paths*.

   This is the disk drive that you will mount to the `content-repo` directory later in this procedure.

7. Click *Add*.

   This displays the Add Drive Letter or Path dialog box.

8. Select *Mount in the Following Empty NTFS Folder*, browse for and select the default `content-repo` directory, then click *Next*.

   The default directory is `*installation_path*\zenworks\work\content-repo`.

   This mounts the default path to the hard drive partition that you selected previously.

   If necessary, format the drive as NTFS using the Computer Management feature in Windows.

9. Click the buttons as necessary to exit and save the configuration change.

10. Copy the files from the old renamed `content-repo` directory to the new `content-repo` directory.

From this point on, all ZENworks Configuration Management data is written directly to the new Content Repository location on the selected hard drive partition.

For Linux servers, you might want the `/opt` directory to be located on a large partition. This is where the database (if embedded) and content repository are stored.

The minimum disk configuration is required as follows:

Table A-2 *Disk Setup for Windows*

Partitions	Size	Contains
Boot (C:)	20 GB	Windows System
Install (D:)	40 GB and larger	*Installation directory*/ZENWORKS

Partitions	Size	Contains
Content	40 GB and larger	Mounted to *Installation directory*/ZENWORKS/work/content-repo

Table A-3 *Disk Setup for Linux*

Partitions	Size	Contains
/boot	300 Mb	Linux boot / ext2
/swap	4 GB	Linux swap
/root	20 GB	Linux system / ext3
Content	40 GB and larger	Mounted to `/var/opt/novell/zenworks/content-repo`

A.4 Logging Information

The Message Logger component of Novell ZENworks 10 Configuration Management lets the other ZENworks components such as zenloader and web services, ZENworks Management Daemon (ZMD), Remote Management, and Policy Enforcers log messages to different output targets. The output targets include the system log, local log, database, SMTP, SNMP trap, and UDP. For more information, see *Message Logging* in the *ZENworks 10 Configuration Management System Administration Reference*.

Message Logger performs the following functions:

- Writes messages to local log files.
- Writes messages to a system log or event log.
- Writes messages to the Management console.
- Sends messages to the Management server.
- Sends messages as SMTP mail to SMTP servers from the Primary Server.
- Sends messages as SNMP traps to remote or local machines from the Primary Server.
- Sends messages as UDP packets to UDP destinations.
- Writes messages to the ZENworks database.
- Automatically purges database entries from the ZENworks database.
- Automatically acknowledges the messages in the ZENworks database.

The following sections contain more information:

- Section A.4.1, “Local Log File,” on page 108
- Section A.4.2, “Installation Log File,” on page 108
- Section A.4.3, “Registration Log File,” on page 108

A.4.1 Local Log File

On a managed device, the location of the local log file is:

```
novell\zenworks\logs\localstore\zmd-messages.log
```

On a ZENworks Server, the location of the local log file is:

- ZENworks Services:

  Linux: `/var/opt/novell/log/zenworks/services-messages.log`

  Windows: `novell\zenworks\logs\services-messages.log`

- ZENloader and its modules:

  Linux: `/var/opt/novell/log/zenworks/loader-messages.log`

  Windows: `novell\zenworks\logs\loader-messages.log`

A message is an event that is generated by different components and modules. These events can be exceptions such as errors, warnings, information to a user, or a debug statement for a module.

Messages are classified based on the following severity levels:

- **Error:** Indicates that an action cannot be completed because of a user or system error. These messages are critical and require immediate attention from an administrator.
- **Warning:** Indicates an exception condition. These messages might not be an error but can cause problems if not resolved. These messages do not require immediate attention from an administrator.
- **Information:** Provides feedback about something that happened in the product or system that is important and informative for an administrator.
- **Debug:** Provides debug information to troubleshoot and solve problems that might occur. The debug messages are stored only in the local file.

For additional information related to message logging, see *Message Logging* in the *ZENworks 10 Configuration Management System Administration Reference*

A.4.2 Installation Log File

The log file related to the installation of ZENworks can be found at the following location, for both the Linux and Windows platforms:

`Install_Path``\logs\ZENworks_Install_`*`date`*`.log.xml`

A.4.3 Registration Log File

The log files related to registration can be found in the following locations:

Server Log File

Linux: `/var/opt/Novell/logs/zenworks/service-messages.log`

Windows: `/Novell/ZENWorks/logs/service-messages.log`

Agent Log File

```
Novell/ZENworks/logs/LocalStore/zmd-messages.log
```

A.5 Backing Up and Restoring the ZENworks Certificate Authority

When you install ZENworks Configuration Management for the first time you are prompted to either create an internal Certificate Authority (CA) or provide the appropriate certificate information for an external CA. If you are using the built-in CA, it is important to keep in mind that the CA can be backed up and restored if you require this as part of a set of troubleshooting procedures.

To back up the CA files on the Primary Server that is configured to be the ZENworks internal CA:

1. At the command prompt of the ZENworks Server, enter the following command:

   ```
   zman certificate-authority-export (certificate-authority-export/cae)
   [options] (file path)
   ```

   This command exports the key-pair credentials of the zone certificate authority to a file.
2. Enter the username and password of the administrator of the Management Zone.
3. Enter a passphrase for the file encryption.

   The passphrase is used in the encryption of the backed-up file.

To restore the CA files on the Primary Server that is configured to be the ZENworks internal CA:

1. At the command prompt of the ZENworks Server, enter the following zman command:

   ```
   zman certificate-authority-import (certificate-authority-import/cai) (file
   path)
   ```

   This command imports the key-pair credentials of the zone certificate authority from a file.
2. Enter the username and password of the administrator of the Management Zone.
3. Enter the file encryption passphrase you specified when you backed up the Certificate Authority files

B The ZENworks Configuration Management Architecture

The following sections are intended to be a reference for the Novell ZENworks Configuration Management architecture and should be used for education purposes. Because the architecture for ZENworks Configuration Management has changed dramatically, it is important to have a better understanding of these changes and how the system components interact now that the new architecture has been introduced to the marketplace.

- Section B.1, "ZENworks Architecture Reference," on page 111
- Section B.2, "Detailed ZENworks Components Diagram," on page 116

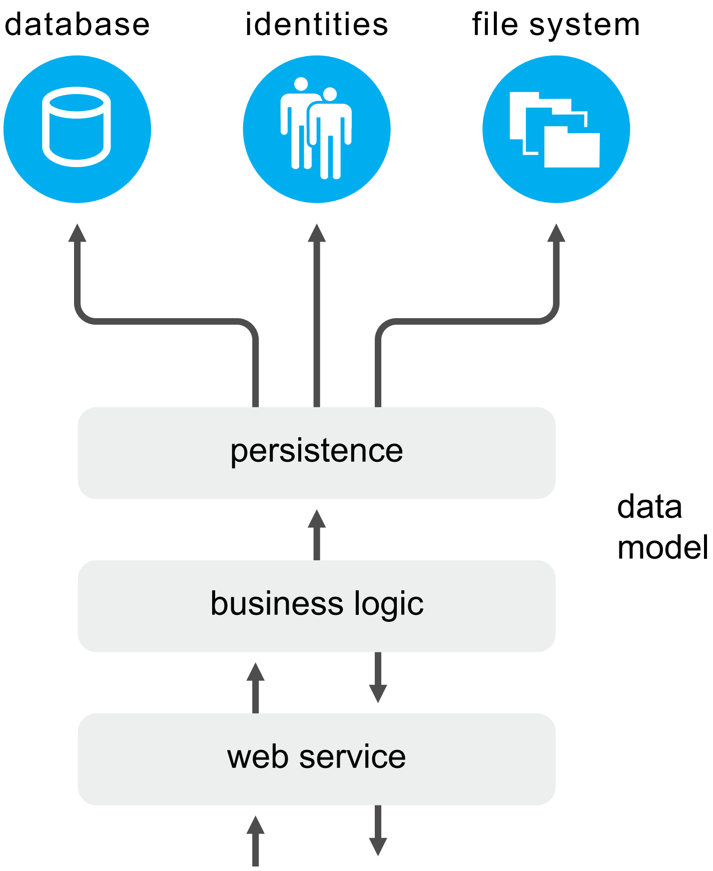
B.1 ZENworks Architecture Reference

Out of the box, ZENworks Configuration Management provides a standards-based, three-tier, services-oriented architecture that allows you to manage devices over the Internet without disrupting your network infrastructure. Separating components into different tiers makes it easier to change business logic or add new modules without affecting other tiers of the architecture.

The server-side infrastructure consists of two tiers. The first tier provides Web services, including object-to-relational mapping and data-model APIs. The second tier comprises the file system for storing actual files, the database for storing ZENworks information, and the optional identity store (eDirectory or Active Directory) for performing user-based resource management. The third tier consists of the ZENworks Adaptive Agent on managed devices.

The following diagram is a visual representation of the three-tier web services architecture (including the optional connection to a user source) of ZENworks Configuration Management.

Figure B-1 Web Services Architecture



Because it is a fully Web-based application, ZENworks Configuration Management uses Web services as the primary mechanism for communications between management servers, managed clients, identity and object stores, and the management console. No proprietary protocols are used.

The following sections contain more information:

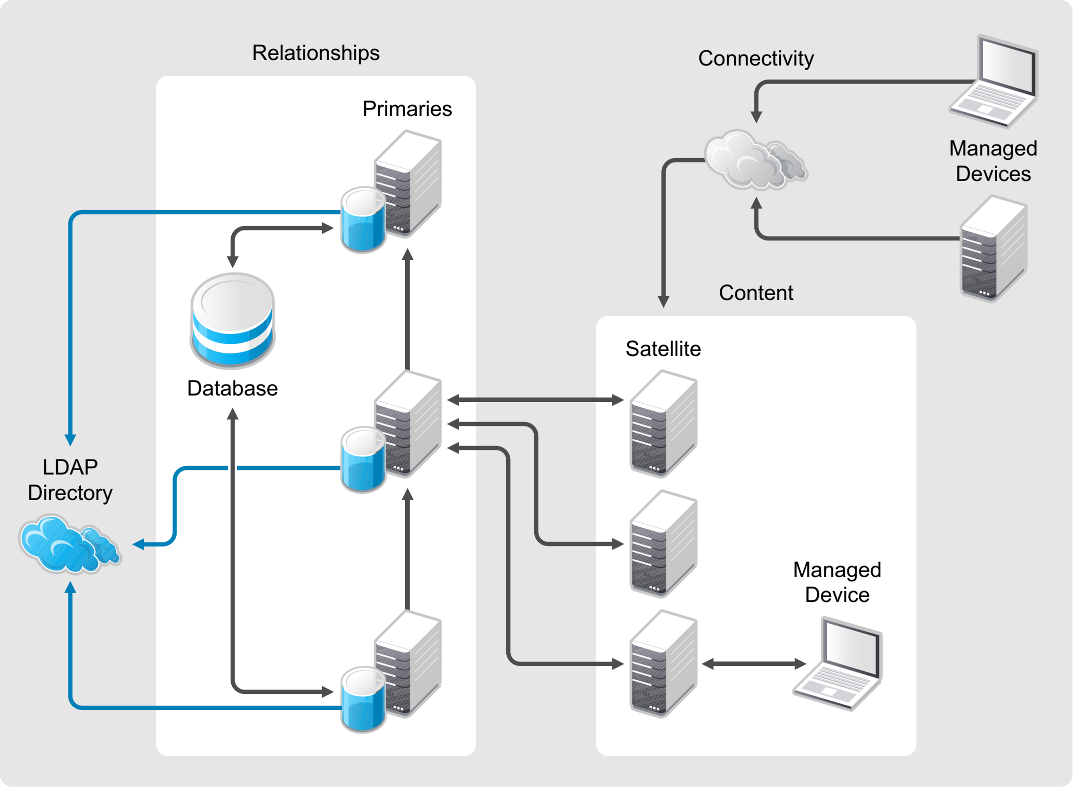
- Section B.1.1, "Standard Protocols," on page 112
- Section B.1.2, "ZENworks Primary Server Architectural Components," on page 113
- Section B.1.3, "Agent Architecture," on page 115
- Section B.1.4, "Agent Communication," on page 115

B.1.1 Standard Protocols

- **HTTP or HTTPS:** Used for communication from managed clients to the server.
- **SOAP over HTTPS:** Used for communication from the server to the ZENworks Adaptive Agent on managed devices.
- **LDAP:** Used for integration with eDirectory or Active Directory identity stores.
- **SOAP:** Used for zone administration win zman.
- **SSL:** Used for secure communications with managed devices and the management console. This allows devices located anywhere to be managed from anywhere, even beyond the corporate firewall.

The following graphic illustrates this:

Figure B-2 *ZENworks System Diagram*



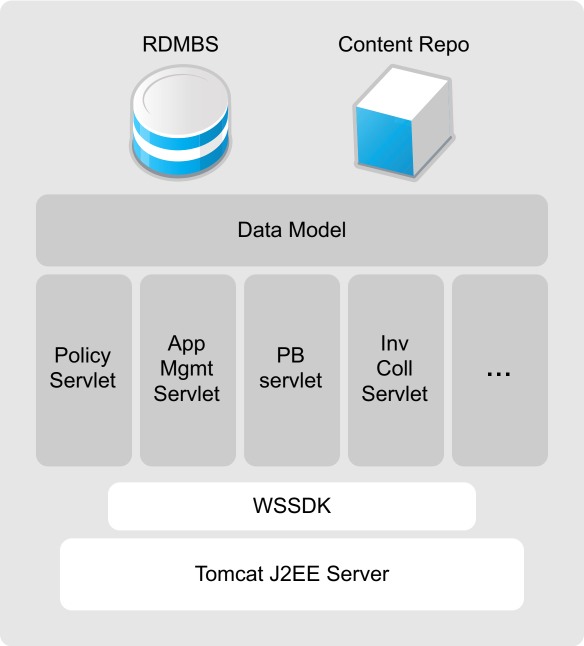
B.1.2 ZENworks Primary Server Architectural Components

A ZENworks Primary Server delivers the back-end infrastructure of ZENworks Configuration Management. The following items are the components of the ZENworks primary server:

- Apache Tomcat is a servlet container that provides Web serving, Java servlet hosting, and SSL encryption and authorization.
- Extend WSSDK provides the core SOAP infrastructure.
- Java servlets implement feature-specific functionality.
- The data model abstracts the storage layer from the Web services.
- The database stores relationships, configuration management data, and inventory.
- The Content Repository contains images, files, and other bundle content.

The following diagram is a visual representation of the Primary Server (ZENServer) architecture:

Figure B-3 Primary Server Architecture



Advantages of this simplified architecture include:

Time to value: The new architecture allows you to install ZENworks Configuration Management with just a few mouse-clicks. Very little administrator input is required to install a Primary Server, and it typically takes only 35 minutes from the time you drop the CD into the tray until you can actually be discovering and managing devices on your network. The ZENworks Adaptive Agent is installed and managed from the central management console, eliminating the need for IT to touch each individual device. The system connects non-disruptively to your identity stores—Active Directory and Novell eDirectory—requiring no changes to your security policies. Because it's based on more than two years of human factors research and input from users, the user interface works the way you work, so you can be productive almost immediately.

Deployment flexibility: Configuration management tool should be deployed in a manner that harmonizes with the existing IT infrastructure. The architecture of ZENworks Configuration Management is designed with this requirement in mind, providing the flexibility to deploy the solution in a wide range of IT environments with minimal change management barriers. For example, it can be deployed as a departmental solution or enterprise-wide, without requiring new operating systems, database administration skills, or non-standard communication protocols.

Reduced wire traffic: Metadata is retrieved in a single request or response by using SOAP calls. This minimizes the network traffic devoted to management, in contrast to architectures that must make multiple calls to retrieve raw data for business logic located on the client.

A single client agent: Legacy management practices have created a need for multiple agents, which must be installed, updated, and patched individually, to handle various management tasks. The new ZENworks Configuration Management architecture features a single ZENworks Adaptive Agent that requires just one installation, then dynamically "shrinks" or "expands" according to specific management needs.

B.1.3 Agent Architecture

The ZENworks Adaptive Agent consists of the following components:

- "Primary Agent" on page 115
- "Core Plug-Ins" on page 115
- "Feature-Specific Plug-Ins" on page 115
- "Policy Enforcers" on page 115

Primary Agent

The primary agent is responsible for maintaining connectivity to the ZENworks Primary Servers and listening for requests from the server. This component is implemented as a Windows service and is started at system startup time.

Core Plug-Ins

A core set of plug-ins provides common services required by most features. These plug-ins include the trigger and event scheduling system (TESS) components, caching components, components to implement features such as system shutdown and reboot.

Feature-Specific Plug-Ins

Other features are also implemented by plug-ins to the ZENworks Adaptive Agent. These plug-ins include the Bundle plug-in, Policy plug-in, Inventory plug-in, Remote Management plug-in, and Patch Management plug-in. These plug-ins leverage the core plug-ins and the primary agent to retrieve information from the Primary Server. For instance, the Bundle plug-in is responsible for installing of Windows, File, and Directive bundles.

Policy Enforcers

The Policy plug-in is also divided into multiple components. These components are the Policy Manager, which identifies the effective policies, and the Policy Enforcers, which are platform-specific components that understand how to implement policies.

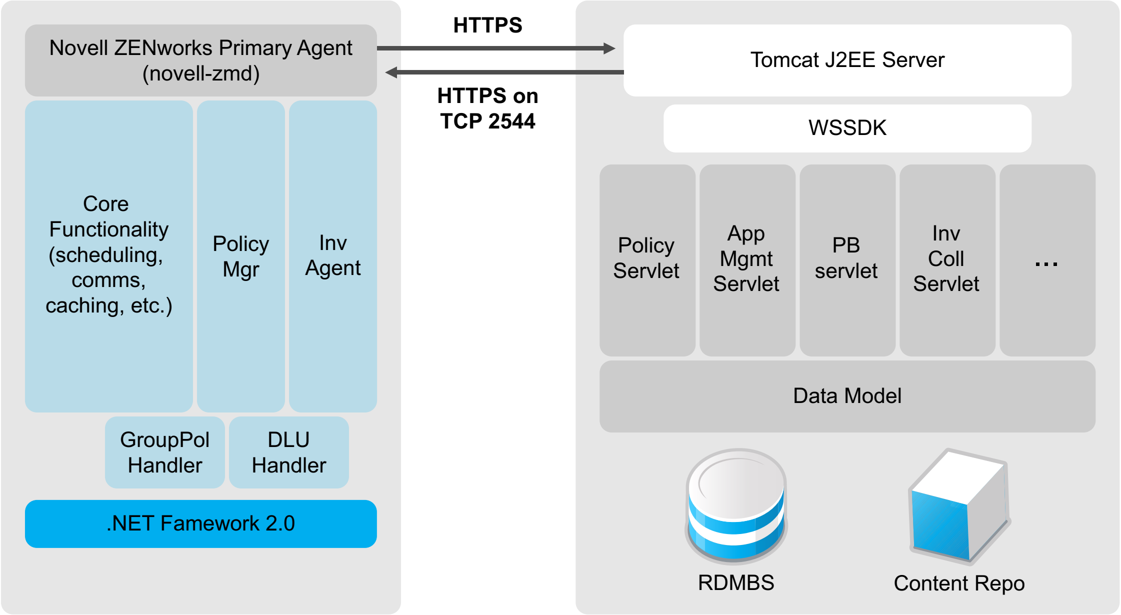
During Adaptive Agent installation, all the components are installed on the managed device and are activated as needed.

B.1.4 Agent Communication

The communication between the ZENworks Adaptive Agent and the ZENworks Primary Server is generally implemented as a standard Web session. Unlike previous versions of ZENworks, the Adaptive Agent does not maintain a session with the Primary Server. Instead, it makes an HTTPS request, receives information it needs, and then disconnects from the Server. The Adaptive Agent also includes an HTTPS listener that is implemented on TCP port 2544. The purpose of this listener is to allow a Primary Server to initiate partial or full refreshes remotely. The result of a refresh is the immediate initiation of task on the device.

The following graphic depicts the ZENworks Adaptive Agent architecture and how the Server and Agent pieces interact with each other:

***Figure B-4** ZENworks Adaptive Agent Architecture*



Modular three-tier services oriented architecture: Standard protocols are used for IT over public and private networks, as well as for communications between the solution's three tiers:

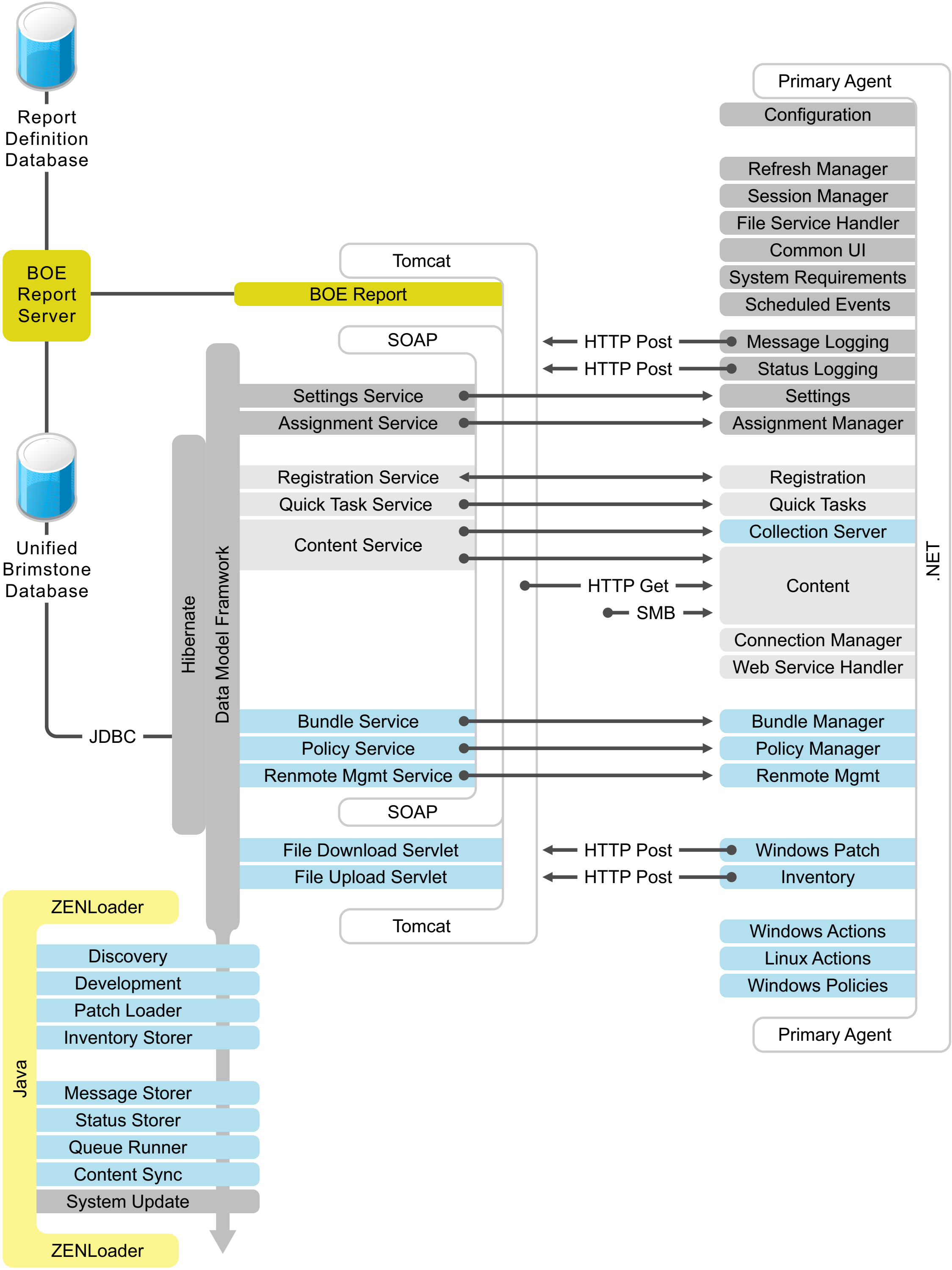
- All general business logic resides on the server, allowing complete flexibility in system-wide updates and keeping client-specific updates to a minimum.
- The single agent is tailored in size and functionality for the specific managed device, enabling the most efficient delivery and policy enforcement.
- An SQL database provides an industry-standard method for integrating the solution with IT and business systems.

Management Zones: Users and devices can be grouped together to form management zones, which provide a single, authoritative source for all configuration information applicable to the members of the Management Zone. All managed devices are registered to a single ZENworks Management Zone.

B.2 Detailed ZENworks Components Diagram

The following diagram is a visual representation of how the individual components of both the ZENworks Server and the ZENworks Adaptive Agent interact with each other at a component-by-component level, and where the processes are initiated. This is a full view of the ZENworks Configuration Management architecture.

Figure B-5 ZENworks Configuration Management Architecture



ZENworks Configuration Management Tuning Parameters For Bundle Distribution

C

Novell ZENworks Configuration Management has different parameters that can be tuned for increased bundle delivery performance. Novell has conducted extensive testing to provide default parameters in ZENworks Configuration Management that provide the best performance for the greatest number of customers. This section should assist customers who need to tune the product to their specific environments.

Currently in ZENworks Configuration Management, there are three parameters that can be tuned for optimal performance:

C.1 JAVA Memory Allocation:

ZENworks Configuration Management uses a 32-bit JVM. Therefore, ZENworks Configuration Management cannot see more than 2 GB of memory. The memory allocated to zenserver and zenloader, by default, should not be changed; they are already at their optimal configuration for the 32-bit JVM being used.

The default and recommended settings are as follows:

Windows:

- Initial Memory Pool: 768
- Maximum Memory Pool: 768
- Thread Stack Size: 768

Linux:

- -Xmx: 1024
- -Xms: 1024
- -Xss: 1

If the memory allocated to ZENworks Configuration Management memory is increased, Java “out of memory” errors occur.

Java memory allocations for both zenserver and zenloader can be found by using the following utilities:

- Windows: Run `ZENserverw` or `ZENloaderw` from the Run line, then click the Java tab.
- Linux: Edit `/etc/init.d/novell-zenserver` or `/opt/novell/zenworks/bin/zenloader`.

C.2 Threads

Tomcat uses HTTP and HTTPS threads to service incoming and outgoing requests.

HTTP threads are used for servicing content. Because the content is already encrypted, there is no need to send it securely.

HTTPS threads are used for all other communication to the Primary Server: login, refresh, and so forth.

By default, these threads are set at 200 for HTTP and 200 for HTTPS. These values can be seen in the `server.xml` file at:

- **Windows:** *`InstallDirectory`*`\Novell\ZENworks\share\tomcat\conf`
- **Linux:** `/opt/novell/zenworks/share/tomcat/conf`

During testing, the HTTP and HTTPS threads in the `server.xml` file were increased from the defaults of 200. Office 2003 was deployed to 1,000 devices and launched on refresh. This testing was done on a gigabit network. The results are as follows:

Table C-1 *Results of Deploying Office 2003 to 1,000 Devices*

HTTP Threads	HTTPS Threads	Results	Explanation
400	200	Failed	ZENserver dies. Java out-of-memory error.
300	300	Failed	Java out-of-memory error.
350	250	Failed	Java out-of-memory error.
350	200	Passed	Time: 35-40 minutes, Client Retries: 15 average. This is the maximum for HTTP threads.
300	200	Passed	Time: 35-40 min. Client Retries: 25 average.
200	200	Passed	Time: 35-40 min. Client Retries: 35 average.

C.3 CLIENT RETRIES

There are three client settings exposed in ZENworks Control Center (accessed by clicking *Configuration* > *Device Management* > *ZENworks Agent*):

Number of Retries: Refers to the maximum number of retries a device attempts.

Initial Wait Time (in seconds): Refers to the initial wait time between retries. All subsequent waits increment by 1 second.

Max wait time: Refers to the maximum time the device waits between retries.

By default, in ZENworks 10 Configuration Management, the settings were 15/4/16 for the above parameters. The default settings in ZENworks Configuration Management 10.2 are 20/10/20. For the majority of the testing, retries were set at 60/30/60. A server was never marked as “bad” and all content was delivered.

No degradation of performance at the client was observed when the retries were set high.

C.4 Recommendations

- Novell recommends keeping the Java memory allocations at the default. When Novell introduces a 64-bit JVM into ZENworks Configuration Management, these recommendations might be revised.
- Novell recommends keeping the HTTPS threads at the default of 200. HTTP threads can be increased up to 350 without seeing performance degradation. By increasing threads, client retries can be reduced while keeping the overall execution time the same.

Reference Materials

D

This section contains references to useful information that is found online at the Novell Web site, as well as information that you can use to create your own Business Requirements and Technical Requirements surveys.

The following sections contain more information:

- Section D.1, “Online Documentation,” on page 123
- Section D.2, “Sample Business Requirements Survey Questions,” on page 123
- Section D.3, “Sample Technical Requirements Survey Questions,” on page 125
- Section D.4, “Extended Port Chart Including Port Usage,” on page 126

D.1 Online Documentation

This section includes a number of links to help customers plan, deploy, and manage their ZENworks Configuration Management infrastructure. These documents should be reviewed prior to the kickoff of the implementation or migration project. It is important to be familiar with the product, its features, and capabilities before you start your assessments and design, and it is especially important before ZENworks Configuration Management goes live. We suggest that you either reference these documents in your own briefings, or print and deliver these documents prior to the start of the project.

- ZENworks 10 Configuration Management SP3 (10.3) documentation (http://www.novell.com/documentation/zcm10/index.html)
- ZENworks Asset Inventory Database Structure Diagram (http://www.novell.com/documentation/zcm10/pdfdoc/schemas/zenworks10_inv_schema_sp3.pdf)
- ZENworks Asset Inventory Database Tables (http://www.novell.com/documentation/zcm10/db_tables/data/bookinfo.html)

D.2 Sample Business Requirements Survey Questions

The following sample survey is a good starting point for you to develop a survey that you can give to the customer as you begin to discuss the ZENworks Configuration Management deployment project. You should modify the survey according to your specific needs. Each customer environment is different and each survey requires a different set of questions.

Please answer the following questions to the best of your abilities, based on the information that you have on hand.

1. Is this is a global organization? How many locations do you have? Where are they specifically?
2. How many people work for your organization? Where are they located based on your answer to the first question? Do you support multiple languages? Do you have a list of departments and internal organizations that you can provide? What is the percentage breakdown of full-time employees, part-time employees, and contractors or consultants?
3. How many total users do you want to manage?

4. How many total devices do you want to manage? What types of devices (laptops, desktops, handhelds)? What platforms are they?
5. In terms of your people and locations, please provide some metrics for the following:
   - How many data centers do you operate? Where are they specifically?
   - What are the size breakdowns of your remote, typically lower bandwidth locations (for example, 10-50 users, 50-250 users, 250-1,000 users, etc.)?
   - What is the bandwidth to your data center and to your remote locations? Best case? Worse case?
   - Do you typically have servers at your remote locations? And if so, which platforms?
   - Where are your departments located? What do you mean by departments? Did you mean remote locations again?
   - Do you have employees that roam from site to site on a regular basis?
   - What percentage of your employee population is considered “mobile employees”?
   - Do you have employees who work from home?
6. Do you have an ITIL initiative in place or under way? If so, which disciplines are you currently utilizing or plan to utilize?
7. Does your organization have Service Level Agreements in place with other internal and external organizations, suppliers, or vendors?
8. What other projects are currently under way at your organization? For example, SAP implementation, Service Desk implementation, Identity Management, Security Management, etc.
9. Are there times during each month or quarter where blackouts to implement changes are in effect?
10. How are often are changes implemented? Do you have a regular schedule? As needed? Are the changes and change windows tightly controlled?
11. Do you have a Change Control Board? If so, who are the members of this board and where are they located? How are changes proposed, reviewed, tracked, and ultimately managed?
12. Do you always have a test environment for each critical system? And if so, are these environments persistent or only available during deployment?
13. Do you have a Security department? If so, who are the leaders of this department and where are they located?
14. Is security managed centrally? Does this include both physical and logical security? Do you have an empowered security officer (CSO, Director, etc.)?
15. Do you have any type of endpoint security in place? For example, USB controls, encryption (full disk or file level), WiFi controls, VPN, or VPN enforcement?
16. Do you have a Service Desk in place? Is it centralized or decentralized? Is this a 24x7 operation? Who manages the Service Desk operations? What service desk are you running (commercial package or homegrown)?
17. Do you have a configuration/change management database system? If so, is this a commercial package (and if so what?) or homegrown?

18. Do you have a Project Management Office in place? Do you typically allocate Project Managers to your internal projects, or is this something that is normally outsourced?
19. Does the organization have any growth plans or expectations (that can be shared) for the upcoming two or three years where you would be expanding outside of your existing location base? What quantity of growth do you expect from a user or device perspective?

D.3 Sample Technical Requirements Survey Questions

The following sample survey is a good starting point for you to develop a survey that you can give to the customer as you begin to discuss the ZENworks Configuration Management deployment project. You should modify the survey according to your specific needs. Each customer environment is different and requires a different set of questions.

Please answer the following questions to the best of your abilities, based on the information that you have on hand.

1. Can you provide a diagram of your network infrastructure, including network hardware, placement, and link speeds?
2. What are the desktop operating systems that you support in your environment?
3. What are the server operating systems that your support in your environment? Do you anticipate leveraging any of your existing server infrastructure to host ZENworks services?
4. How many people will be supported with the ZENworks solution? Do you have initial thoughts on how quickly you would like to deploy this? What is your estimated project completion date?
5. Do you currently support mobile users? Will you begin, or continue, to support mobile users with the new ZENworks implementation?
6. Do you host your own DNS infrastructure? Can you provide details on how your DNS is currently set up?
7. Can you provide details on how your DHCP infrastructure is set up? Can you provide a list of subnets by site (IP subnet design diagram)?
8. Are you currently leveraging any form of Network Access Control (NAC)? If so, which solution is in place?
9. Are you currently leveraging any form of endpoint security management at the desktop and server levels? If so, which solution is in place?
10. How do roaming users access your corporate infrastructure from remote locations (VPN, Access Management, etc.)?
11. Which directory services technologies do you have in place (Novell eDirectory, Microsoft Active Directory, Sun Directory Services, etc.)? Are you able to provide diagrams that show the physical structures of each of the individual directory services that you are currently leveraging?
12. Do you have any existing Identity Management software in place? If so, which product are your currently using?
13. Are you currently utilizing any other systems management products to perform any form of desktop management? If so, provide details around each of the individual point technologies that you are currently leveraging. This would include areas such as:
    - Software provisioning

- Desktop policy management
- Desktop and server OS provisioning
- Patch management
- Hardware inventory collection
- Software inventory collection
- Reporting
- License compliance
- Usage tracking
- Contract management
- Remote control
- Other forms of remote diagnostics
- Thin-client solutions
- Application virtualization
- Other forms of advanced scripting capabilities
- Homegrown processes (provide as much detail as possible on each of the homegrown applications you are currently using for systems management)

14. Are you also performing a hardware refresh at this time? If not, when will you be performing the next one? If so, when will it be complete?
15. What is your turnaround time when it comes to hardware acquisition (desktop and server)?

D.4 Extended Port Chart Including Port Usage

The following table shows the individual ports required to be open, the description of each port, etc.

This is an extended version of the information in Section 3.6, "Ports Used by ZENworks Components," on page 36.

Table D-1 *ZENworks Ports Usage*

Port	Type	From	To	Description	Initiated By	Duration
80	TCP	ZENworks Adaptive Agent	Primary Server or Satellite	Used to download content from Primary Server or Satellite. Used to upload inventory, message data, patch results, etc to a Satellite. Used to download content from Primary Server to Satellite during content replication. Used to roll up the collection data from Satellite to Primary Server.	ZENworks Adaptive Agent	HTTP listener is active until the ZENServer service runs. Active until the completion of the HTTP GET or PUT request.

Port	Type	From	To	Description	Initiated By	Duration
443	TCP	ZENworks Adaptive Agent Management workstation Imaging Satellite	Primary Server or Authentication Satellite	Used mostly for agent communication with the server including authentication, configuration requests, assignments, and registration. Used to send authentication requests to the Satellite server. Hosts ZENworks Control Center. Used by zman to communicate to the administrative Web services on the server.	ZENworks Adaptive Agent or Management workstation	HTTPS listener is active until the ZENServer service runs Active only when an authentication request occurs.
2645	TCP	ZENworks Adaptive Agent	Primary Server	Used for authentication when CASA servlet is not available on 443. This occurs if the ZENServer instance of Tomcat is busy to service the CASA authentication token requests.	Agent (CASA Authenticatio n Token Service)	Listener is active until the CASA instance of Tomcat runs. Active only when an authentication request occurs.
67/ 4011	UDP	Device that is PXE booted	DHCP Sever and Primary Server or Imaging Satellite	The DHCP port is used to request for DHCP and PXE boot information. 4011 is used only if the DHCP server is the ZENworks server as well.	PXE Boot ROM	Listener is active if the Proxy DHCP service is running on the Primary Server or Satellite. Listens for all broadcasts.

Port	Type	From	To	Description	Initiated By	Duration
69	UDP	Device that is PXE booted	Primary Server or Imaging Satellite	The TFTP port is used to download PXE boot files and other imaging files as described in bundles.	PXE Boot ROM ZENworks Network Boot Program ZENworks Imaging Engine WindowsPE Boot Loader WindowsPE ZENworks Work To Do application	Listener is active if the TFTP service is running on the Primary Server or Satellite. Active only when GET or PUT requests are received from the agent.
1333 1	UDP	Device that is PXE booted and finds ZENworks Boot program	Primary Server or Imaging Satellite	Preboot Services lookup port. Used by the PXE boot program as a proxy to the Imaging server. This is required because PXE ROM can communicate only through UDP.	ZENworks Network Boot Program on PXE booted device	Listener is active if the ZENworks Preboot Policy service is running.
998	TCP / UDP	Device that requests for the imaging work		Used to identify the imaging work that needs to be performed and when images are to be sent or received. Generally, the request is from the device that is imaged to the Imaging server. In the case of Preboot Services, forwarding a server in Zone 1 would contact a server in Zone 2 specified in the forwarding list. UDP is used while performing multicast imaging operations.	ZENworks Imaging Distribution Windows PE ZENworks Work To Do application From Primary Server in Zone 1 to Primary Server in Zone 2.	Listener is active until the Novell Preboot Service runs. Active only during the imaging operations or work to do.
5950	TCP	Management Workstation Remote Management Proxy	ZENworks Adaptive Agent			

Port	Type	From	To	Description	Initiated By	Duration
5550	TCP	Managed Device	Management Workstation	Remote Management listener on the Management workstation. This allows users at managed devices to request assistance from the administrator on the Management workstation.	ZENworks Remote Management requester	Listener is active after installed. Connection is active when a user requests assistance.
5750	TCP	Management Workstation	Remote Management Proxy	Remote Management proxy listener. This allows a user connecting through NAT to remote manage a device that can be accessed by the proxy. The Management workstation connects to the proxy on 5750 and the proxy connects to the managed device on 5950.	ZENworks Control Center when initiating a remote management connection through a Remote Management proxy.	Listener is active on the device where you install the Remote Management proxy component. The connection is active from the time the administrator initiates a connection until the connection ends.
7628	TCP	Primary Server	ZENworks Adaptive Agent			
1433	TCP	Primary Server	Microsoft SQL Database	JDBC connection established from Primary Servers to MS SQL.	ZENworks Server and ZENworks Loader services maintain database connections.	Connection is active until the ZENworks Server or Loader runs.
2638	TCP	Primary Server	Sybase Database	JDBC connection established from Primary Servers to Sybase.	ZENworks Server and ZENworks Loader services maintain database connections.	Connection is active until ZENworks Server or Loader runs.

Port	Type	From	To	Description	Initiated By	Duration
1521	TCP	Primary Server	Oracle Database	JDBC connection established from Primary Servers to Oracle.	ZENworks Server and ZENworks Loader services maintain database connections.	Connection is active until ZENworks Server or Loader runs.
1761	UDP			Used to forward subnet-oriented broadcast magic packets for Wake-On-LAN		

E Documentation Updates

This section contains information on documentation content changes that were made in this *System Planning, Deployment, and Best Practices Guide* for Novell ZENworks 10 Configuration Management SP3. The information can help you to keep current on updates to the documentation.

The documentation is provided on the Web in two formats: HTML and PDF. The HTML and PDF documentation are both kept up-to-date with the documentation changes listed in this section.

If you need to know whether a copy of the PDF documentation you are using is the most recent, the PDF document contains its publish date on the front title page.

The documentation was updated on the following date:

- Section E.1, "October 24, 2010," on page 131

E.1 October 24, 2010

Updates were made to the following sections:

Location	Update
Section 3.4, "Scalability, Fault Tolerance, Maintenance, and Sizing of the Database Server," on page 32	Updated Table 3-2 on page 32.
Section 4.2, "Developing a Detailed Design," on page 44	Added the following sections: ◆ "Content Management" on page 76 ◆ "Offline Content Replication and Management" on page 81 ◆ "Satellite Authentication Role" on page 82
Chapter 5, "Deploying ZENworks Configuration Management," on page 87	Added "Deployment Rules of Thumb" on page 88.
Appendix D, "Reference Materials," on page 123	Updated Table D-1 on page 126.