



# Monitoring eDirectory

eG Innovations Product Documentation

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## Chapter 1: Introduction

Novell eDirectory centrally manages access to resources on multiple servers and computers within a given network.

In simplest terms, eDirectory is a hierarchical, object oriented database that represents all the assets in an organisation in a logical tree. Assets can include people, positions, servers, workstations, applications, printers, services, groups, etc.

Inconsistencies in the performance of this central resource-repository could put critical resources out of a normal user's reach. Continued disturbances will hence severely affect organizational productivity. The need therefore is for a monitoring solution that can perform 24 x 7 monitoring of eDirectory and informs administrators of issues, well before any visible damage occurs.

The eG Enterprise suite with its proactive problem alerting capability is ideal for this purpose. The eG agent serves as a data collector that periodically extracts critical performance statistics from the eDirectory server. The suite then compares these values with manually/automatically set performance baselines, and thus instantaneously detects probable deviations - details pertaining to the probable issues are then quickly provided to administrators, who initiate the corrective measures, without any delay.

The metrics so extracted by the eG agent enables the administrators to find accurate answers to the following performance queries:

Cache Monitoring	<ul style="list-style-type: none"><li>• Are the block and entry caches of the eDirectory server sufficiently sized?</li><li>• Are cache hits optimal?</li><li>• Are there too many direct disk accesses?</li></ul>
Access Monitoring	<ul style="list-style-type: none"><li>• What are the number and type of requests that are handled by the eDirectory server?</li><li>• Is the error rate very high?</li><li>• Are too many requests chained?</li><li>• Is the load on the server manageable?</li></ul>

## Chapter 2: How to Monitor eDirectory Using eG Enterprise?

To capture and present these metrics in the monitoring console in a user-friendly format, eG Enterprise provides, not one, but two eDirectory monitoring models – the EDirectory (Netware) model to monitor eDirectory on the Netware operating system, and the EDirectory (Win/Unix) model for monitoring the eDirectory on Windows and Unix operating systems.

### 2.1 Pre-requisites for Monitoring the Novell eDirectory

To make the eG agent to communicate with eDirectory's SNMP MIB, you need to ensure the following:

- The SNMP service of the operating system should be installed and started
- The operating system's service pack should be reapplied after installing eDirectory
- The SNMP service of eDirectory should be started

In a Windows installation of eDirectory, follow the steps below to install and start the Windows SNMP service:

1. Go to the **Control Panel** using the menu sequence: Start -> Settings -> Control Panel.
2. Double-click on the **Add/Remove Programs** option within.
3. Figure 2.1 will then appear. Double-click on the **Add/Remove Windows Components** button in the left panel of Figure 2.1.

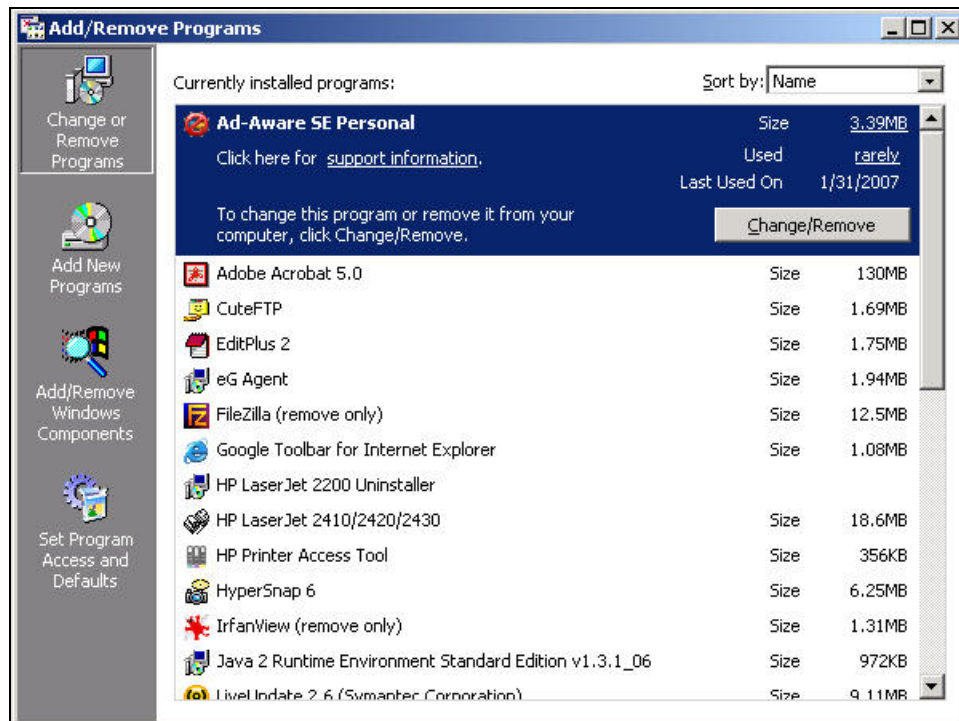


Figure 2.1: The Add/Remove Programs window

4. Doing so invokes Figure 2.2 that lists the components that can be added or removed. Next, click on the **Management and Monitoring Tools** option from the **Components** list.

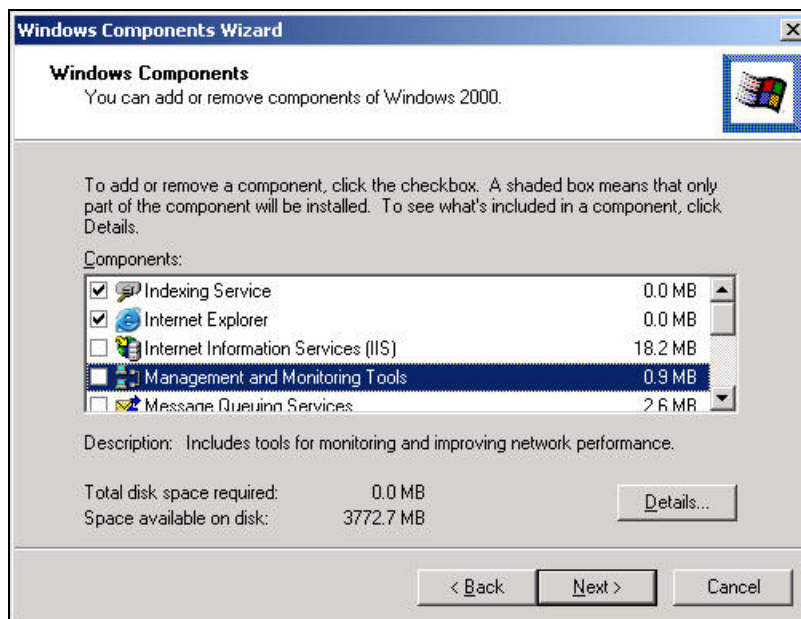


Figure 2.2: Components that can be added/removed

- Figure 2.3 that appears next reveals the management tools that can be / have already been installed on the Windows operating environment. To install the SNMP service, select the check box preceding the **Simple Network Management Protocol** option in Figure 2.3, and click the **OK** button therein.

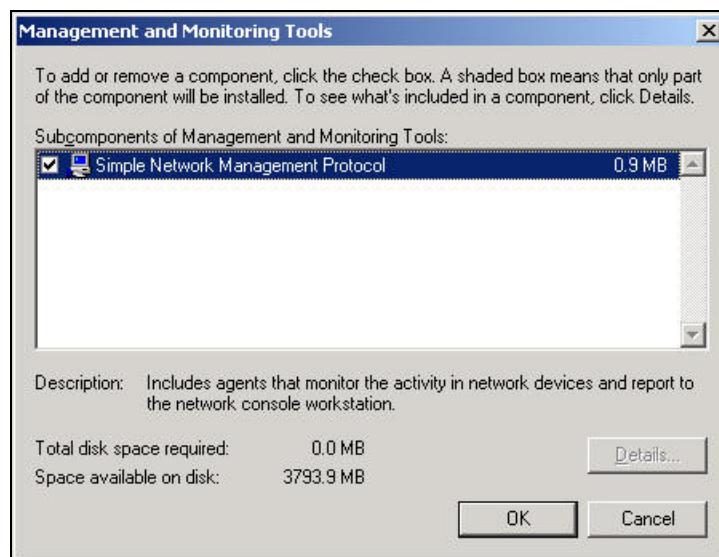


Figure 2.3: Selecting SNMP for installation

- You will return to Figure 2.2. To proceed with the SNMP installation, click on the **Next** button in Figure 2.2.
- Once installation ends, start the SNMP service. To do so, first, follow the menu sequence, Start - > Run, and type **services.msc** in the **Run** text box. The **Services** window then appears. To start the SNMP service, select the **SNMP Service** from the Services list, right-click on it, and select **Start** from its shortcut menu.

Next, make sure that the eDirectory's SNMP service is started. The SNMP service for eDirectory is installed when eDirectory is installed. To start the service on a Windows installation of eDirectory, do the following:

- Open the **Control Panel** and double-click on the **Novell eDirectory Services** option within (see Figure 2.4).



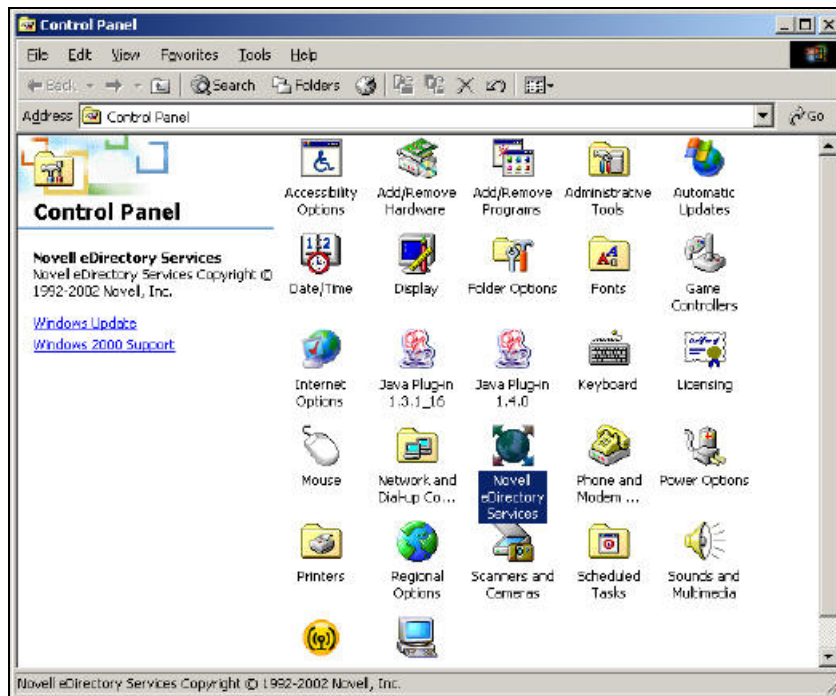


Figure 2.4: Selecting the Novell eDirectory Services

- From the list of services that is displayed (see Figure 2.5), select the **ndssnmp.dlm** service and click on the **Start** button therein to start it.

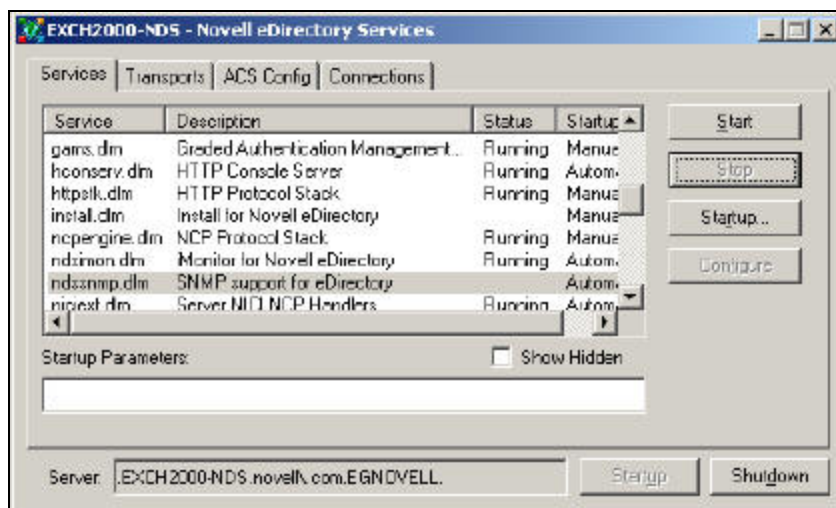


Figure 2.5: Starting the eDirectory SNMP service

- Figure 2.6 will then appear prompting you to provide authentication to start the SNMP service.



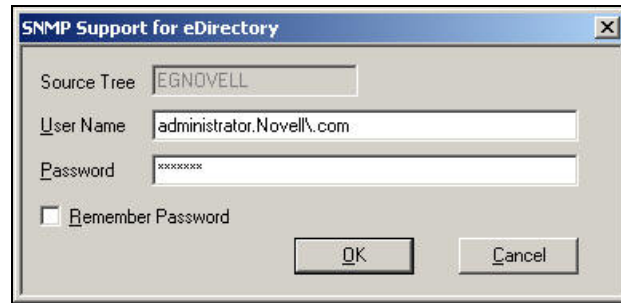


Figure 2.6: Authentication for starting the SNMP service

4. Provide an administrator's **User Name** and **Password** in Figure 2.6. You can also save the password so that the password prompt does not reappear every time you attempt to restart the service. To ensure this, simply, select the **Remember Password** check box in Figure 2.6. Finally, click the **OK** button therein to start the SNMP service.

## 2.2 Managing the EDirectory (Netware) Server

To achieve this, do the following:

1. Log into the eG administrative interface.
2. eG Enterprise cannot automatically discover the EDirectory (Netware) servers. You need to manually add the eDirectory NetWare using the **COMPONENTS** page (see Figure 2.7) that appears when the Infrastructure -> Components -> Add/Modify menu sequence is followed. Remember that components manually added are managed automatically.

The screenshot shows a web form titled 'COMPONENT' with a 'BACK' button. A yellow banner states: 'This page enables the administrator to provide the details of a new component'. Below this, there are two dropdown menus: 'Category' set to 'All' and 'Component type' set to 'EDirectory (Netware)'. The form is divided into two sections: 'Component information' and 'Monitoring approach'. In the 'Component information' section, 'Host IP/Name' is '192.168.10.1', 'Nick name' is 'EDnet', and 'Port number' is 'NULL'. In the 'Monitoring approach' section, 'Agentless' is unchecked, 'Internal agent assignment' is set to 'Auto' (with 'Manual' as an option), and 'External agents' is a list containing '192.168.8.57', 'ext\_8.137', 'Rem\_8.164', and 'Rem\_9.64'. An 'Add' button is at the bottom.

COMPONENT	
This page enables the administrator to provide the details of a new component	
Category: All	Component type: EDirectory (Netware)
<b>Component information</b>	
Host IP/Name	192.168.10.1
Nick name	EDnet
Port number	NULL
<b>Monitoring approach</b>	
Agentless	<input type="checkbox"/>
Internal agent assignment	<input checked="" type="radio"/> Auto <input type="radio"/> Manual
External agents	<div>192.168.8.57 ext_8.137 Rem_8.164 Rem_9.64</div>
<b>Add</b>	

Figure 2.7: Adding the EDirectory (Netware) server

- When you attempt to sign out, a list of unconfigured tests appears (see Figure 2.8).

List of unconfigured tests for "EDirectory (Netware)"		
Performance		EDnet
Nw Processes	EDirectory Database Cache	EDirectory Protocol
Network Interfaces	Nw File Systems	Nw Memory
Nw Processor	Nw Volume Space	TCP Statistics

Figure 2.8: List of unconfigured tests for the EDirectory (Netware) server

- To know how to configure the tests, refer to the [Monitoring Novell eDirectory](#) chapter.
- Finally signout of the eG administrative interface.

## Chapter 3: Monitoring Novell eDirectory

To capture and present these metrics in the monitoring console in a user-friendly format, eG Enterprise provides, not one, but two eDirectory monitoring models – the EDirectory (Netware) model to monitor eDirectory on the Netware operating system, and the EDirectory (Win/Unix) model for monitoring the eDirectory on Windows and Unix operating systems. Figure 3.1 depicts the EDirectory (Netware) monitoring model.

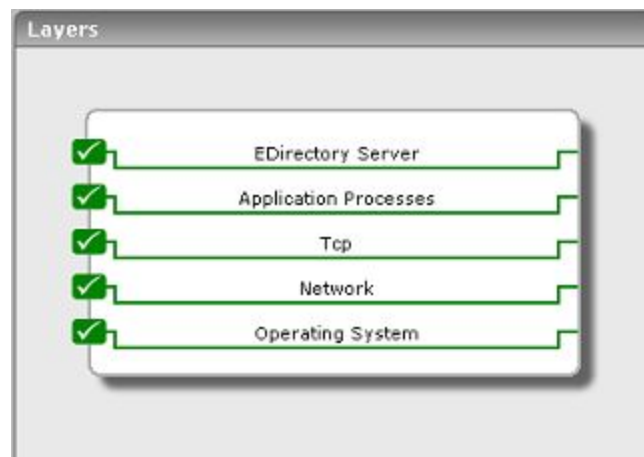


Figure 3.1: The layer model of an eDirectory server

Though both the EDirectory (Netware) and EDirectory (Win/Unix) models share the same set of layers, the difference lies in the tests mapped to the operating system-specific layers – in other words, the bottom 4 layers of Figure 3.1. To know the details of tests mapped to these 4 layers on Windows/Unix environments, refer to the *Monitoring Unix and Windows Servers* document. Similarly, to know which tests are associated with these 4 layers on Netware, refer to Chapter 4 in the *Monitoring Applications that Support the Host Resources MIB* document. This document however, will discuss the details of tests mapped to and metrics reported by the topmost layer of Figure 3.1.

Once the SNMP agent (i.e., the operating system's SNMP service) and sub-agent (i.e., eDirectory's SNMP service) are up and running, the eG agent communicates with the agent and sub-agent to collect the required metrics from within eDirectory's SNMP MIB.

### 3.1 The EDirectory Server Layer

The tests associated with this layer (see Figure 3.2) enable extensive monitoring of the following:

- The extent of utilization of the caches associated with every eDirectory database
- The efficiency of every application protocol interface of the eDirectory server



Figure 3.2: The tests associated with the EDirectory Server layer

### 3.1.1 EDirectory Database Cache Test

The most significant setting that affects eDirectory performance is the cache. With eDirectory 8.5 or later, you can specify a block cache limit and an entry cache limit. The block cache caches only physical blocks from the database. The entry cache caches logical entries from the database. The caching of entries reduces the processing time required to instantiate entries in memory from the block cache.

This test monitors the block and entry caches of every eDirectory database, and reports whether they are efficiently utilized or not.

**Target of the test :** An eDirectory server

**Agent deploying the test :** An internal agent

**Outputs of the test :** One set of results for every eDirectory database being monitored.

**Configurable parameters for the test**

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the host for which this test is to be configured.
SNMPPort	The port at which the monitored target exposes its SNMP MIB; The default value is 161.

Parameter	Description
SNMPVersion	By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the SNMPversion list is <b>v1</b> . However, if a different SNMP framework is in use in your environment, say SNMP <b>v2</b> or <b>v3</b> , then select the corresponding option from this list.
SNMPCommunity	The SNMP community name that the test uses to communicate with the firewall. This parameter is specific to SNMP <b>v1</b> and <b>v2</b> only. Therefore, if the SNMPVersion chosen is <b>v3</b> , then this parameter will not appear.
UserName	This parameter appears only when <b>v3</b> is selected as the SNMPVersion. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against this parameter.
Context	This parameter appears only when v3 is selected as the SNMPVersion. An SNMP context is a collection of management information accessible by an SNMP entity. An item of management information may exist in more than one context and an SNMP entity potentially has access to many contexts. A context is identified by the SNMPEngineID value of the entity hosting the management information (also called a contextEngineID) and a context name that identifies the specific context (also called a contextName). If the Username provided is associated with a context name, then the eG agent will be able to poll the MIB and collect metrics only if it is configured with the context name as well. In such cases therefore, specify the context name of the Username in the Context text box. By default, this parameter is set to <i>none</i> .
AuthPass	Specify the password that corresponds to the above-mentioned Username. This parameter once again appears only if the SNMPversion selected is <b>v3</b> .
Confirm Password	Confirm the AuthPass by retyping it here.
AuthType	This parameter too appears only if <b>v3</b> is selected as the SNMPversion. From the Authtype list box, choose the authentication algorithm using which SNMP v3 converts the specified username and password into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options: <ul style="list-style-type: none"> <li>• <b>MD5</b> – Message Digest Algorithm</li> <li>• <b>SHA</b> – Secure Hash Algorithm</li> </ul>
EncryptFlag	This flag appears only when <b>v3</b> is selected as the SNMPversion. By default, the eG

Parameter	Description
	agent does not encrypt SNMP requests. Accordingly, the this flag is set to <b>No</b> by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the <b>Yes</b> option.
EncryptType	<p>If this EncryptFlag is set to <b>Yes</b>, then you will have to mention the encryption type by selecting an option from the EncryptType list. SNMP v3 supports the following encryption types:</p> <ul style="list-style-type: none"> <li>• <b>DES</b> – Data Encryption Standard</li> <li>• <b>AES</b> – Advanced Encryption Standard</li> </ul>
EncryptPassword	Specify the encryption password here.
Confirm Password	Confirm the encryption password by retyping it here.
Timeout	Specify the duration (in seconds) within which the SNMP query executed by this test should time out in this text box. The default is 10 seconds.
Data Over TCP	By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the monitored target over TCP (and not UDP). For this, set this flag to <b>Yes</b> . By default, this flag is set to <b>No</b> .

### Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
EDirectory database size	Indicates the current size of the eDirectory database.	KB	
Database block size	Indicates the current block size of the eDirectory database.	KB	
Database entry current size	Indicates the current entry cache size.	KB	With an entry cache and a block cache, the total available memory for caching should be shared between the

Measurement	Description	Measurement Unit	Interpretation
			two caches. If the server you are installing eDirectory on does not have a replica, the default is a hard memory limit of 16 MB, with 8 MB for block cache and 8 MB for entry cache. If the server contains a replica, the default is a dynamically adjusting limit. The dynamically adjusting limit causes eDirectory to periodically adjust its memory consumption in response to the ebb and flow of memory consumption by other processes. You specify the limit as a percentage of available physical memory. Using this percentage, eDirectory recalculates a new memory limit at fixed intervals.
Database block current size	Indicates the current block cache size.	KB	The new memory limit is the percentage of physical memory available at the time. Along with the percentage, you can set a maximum and minimum threshold. The threshold is the number of bytes that eDirectory will adjust to. It can be set as either the number of bytes to use or the number of bytes to leave available. The minimum threshold default is 16 MB. The maximum threshold default is 4 GB. With the dynamically adjusting limit, you also specify the interval length. The default interval is 15 seconds. The shorter the interval, the more the memory consumption is based on current conditions.
Database entry items cached	Indicates the number of entries in the entry cache, currently.	Number	An Entry cache is most useful for operations that browse the eDirectory tree by reading through entries, such as name resolution. A well-sized entry cache thus speeds up the retrieval of



Measurement	Description	Measurement Unit	Interpretation
			entries referenced from an index. Therefore, ideally, the value of this measure should be high.
Database block items cached	Indicates the number of blocks in the block cache, currently.	Number	<p>A well-sized block cache is most useful for update operations and can speed up index searching. A very low number of blocks in this cache could considerably slow-down key eDirectory operations. Therefore, ideally, this value should be high.</p> <p>The more blocks and entries that can be cached, the better the overall performance will be.</p>
Database entry cache hits	Indicates the percentage of database hits that were served by the entries in the entry cache.	Percent	Typically, a 1:1 ratio for block cache, and a 1:2 or 1:4 ratio for the entry cache is desired. Anything lesser indicates that the entry and block caches are unable to fulfill most of the requests to the eDirectory server. This happens when an adequate number of blocks/entries is not cached.
DB block cache hits	Indicates the percentage of database hits that were serviced by the blocks in the block cache.	Percent	<p>Badly-sized caches escalate direct disk accesses and processing overheads as well.</p> <p>The ideal is to cache the entire database in both the entry and block caches, although this is not possible for extremely large databases.</p>

### 3.1.2 EDirectory Protocol Test

This test provides summary statistics on the accesses, operations and errors for each application protocol interface of a directory server.

**Target of the test :** An eDirectory server

**Agent deploying the test :** An internal agent

**Outputs of the test :** One set of results for every application protocol interface of the eDirectory server being monitored.

### Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the host for which this test is to be configured.
SNMPPort	The port at which the monitored target exposes its SNMP MIB; The default value is 161.
SNMPVersion	By default, the eG agent supports SNMP version 1. Accordingly, the default selection in the SNMPVersion list is <b>v1</b> . However, if a different SNMP framework is in use in your environment, say SNMP <b>v2</b> or <b>v3</b> , then select the corresponding option from this list.
SNMPCommunity	The SNMP community name that the test uses to communicate with the firewall. This parameter is specific to SNMP <b>v1</b> and <b>v2</b> only. Therefore, if the SNMPVersion chosen is <b>v3</b> , then this parameter will not appear.
UserName	This parameter appears only when <b>v3</b> is selected as the SNMPVersion. SNMP version 3 (SNMPv3) is an extensible SNMP Framework which supplements the SNMPv2 Framework, by additionally supporting message security, access control, and remote SNMP configuration capabilities. To extract performance statistics from the MIB using the highly secure SNMP v3 protocol, the eG agent has to be configured with the required access privileges – in other words, the eG agent should connect to the MIB using the credentials of a user with access permissions to be MIB. Therefore, specify the name of such a user against this parameter.
Context	This parameter appears only when v3 is selected as the SNMPVersion. An SNMP context is a collection of management information accessible by an SNMP entity. An item of management information may exist in more than one context and an SNMP entity potentially has access to many contexts. A context is identified by the SNMPEngineID value of the entity hosting the management information (also called a contextEngineID) and a context name that identifies the specific context (also called a contextName). If the Username provided is associated with a context name, then the eG agent will be able to poll the MIB and collect metrics only if it is configured with the context name as well. In such cases therefore, specify the context name of the Username in the Context text box. By default, this parameter is set to <i>none</i> .
AuthPass	Specify the password that corresponds to the above-mentioned Username. This parameter once again appears only if the SNMPVersion selected is <b>v3</b> .
Confirm Password	Confirm the AuthPass by retyping it here.

Parameter	Description
AuthType	<p>This parameter too appears only if <b>v3</b> is selected as the SNMPversion. From the Authtype list box, choose the authentication algorithm using which SNMP v3 converts the specified username and password into a 32-bit format to ensure security of SNMP transactions. You can choose between the following options:</p> <ul style="list-style-type: none"> <li>• <b>MD5</b> – Message Digest Algorithm</li> <li>• <b>SHA</b> – Secure Hash Algorithm</li> </ul>
EncryptFlag	<p>This flag appears only when <b>v3</b> is selected as the SNMPversion. By default, the eG agent does not encrypt SNMP requests. Accordingly, the this flag is set to <b>No</b> by default. To ensure that SNMP requests sent by the eG agent are encrypted, select the <b>Yes</b> option.</p>
EncryptType	<p>If this EncryptFlag is set to <b>Yes</b>, then you will have to mention the encryption type by selecting an option from the EncryptType list. SNMP v3 supports the following encryption types:</p> <ul style="list-style-type: none"> <li>• <b>DES</b> – Data Encryption Standard</li> <li>• <b>AES</b> – Advanced Encryption Standard</li> </ul>
EncryptPassword	Specify the encryption password here.
Confirm Password	Confirm the encryption password by retyping it here.
Timeout	Specify the duration (in seconds) within which the SNMP query executed by this test should time out in this text box. The default is 10 seconds.
Data Over TCP	<p>By default, in an IT environment, all data transmission occurs over UDP. Some environments however, may be specifically configured to offload a fraction of the data traffic – for instance, certain types of data traffic or traffic pertaining to specific components – to other protocols like TCP, so as to prevent UDP overloads. In such environments, you can instruct the eG agent to conduct the SNMP data traffic related to the monitored target over TCP (and not UDP). For this, set this flag to <b>Yes</b>. By default, this flag is set to <b>No</b>.</p>

### Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Unauthenticated bind requests	Indicates the number of unauthenticated/anonymous	Number	All LDAP clients bind (connect) to Novell eDirectory as one of the

Measurement	Description	Measurement Unit	Interpretation
received	bind requests received since the last measurement period.		<p>following types of users:</p> <ul style="list-style-type: none"> <li>• [Public] User (Anonymous Bind)</li> <li>• Proxy User (Proxy User Anonymous Bind)</li> <li>• NDS or eDirectory User (NDS User Bind)</li> </ul> <p>The type of bind the user authenticates with determines the content that the LDAP client can access. An anonymous bind is a connection that does not contain a username or password. If an LDAP client without a name and password binds to LDAP Services for eDirectory and the service is not configured to use a Proxy User, the user is authenticated to eDirectory as user [Public]. By default, user [Public] is assigned the Browse right to the objects in the eDirectory tree. The default Browse right for user [Public] allows users to browse eDirectory objects, but blocks user access to the majority of object attributes.</p> <p>This measure provides a fair idea of the number of [Public] users who are attempting to connect to Novell eDirectory.</p>
Bind requests that have been rejected	Indicates the number of bind requests that have been rejected due to inappropriate authentication or invalid	Number	<p>This is a good indicator of the health of the security mechanism.</p> <p>If the value of this measure is unusually high, then you might have</p>

Measurement	Description	Measurement Unit	Interpretation
	credentials, since the last measurement period.		to investigate further to determine whether all rejects are genuine.
Read requests received	Indicates the number of read requests received by the eDirectory server since the last measurement period.	Number	
Add-entry requests received	Indicates the number of addEntry requests received by the eDirectory server since the last measurement period.	Number	<i>addEntry</i> requests attempt to create a new object - for example, adding a user object using ConsoleOne.
Remove-entry requests received	Indicates the number of removeEntry requests received by the eDirectory server since the last measurement period.	Number	A removeEntry request attempts to remove an entry from the eDirectory server - for example, deleting a user using ConsoleOne.
Modify-entry requests received	Indicates the number of modifyEntry requests received by the eDirectory server since the last measurement period.	Number	A non-zero value for this measure indicates the number of requests received for modifying one/more eDirectory entries - for example, modifying the attributes of any user using ConsoleOne.
Search requests received	Indicates the number of search requests received since the last measurement period - this includes baseObject searches, oneLevel searches, and whole subtree searches.	Number	
Operations forwarded by this eDirectory server	Indicates the number of operations forwarded by this eDirectory server to other eDirectory servers since the last measurement period.	Number	An LDAP client issues a request to an LDAP server, but the server cannot find the target entry of the operation locally. Using the knowledge references that it has about partitions and other servers in the eDirectory tree, the LDAP

Measurement	Description	Measurement Unit	Interpretation
			<p>server identifies another LDAP server that knows more about the DN. The first LDAP server then contacts the identified (second) LDAP server. If necessary, this process continues until the first server contacts a server that holds a replica of the entry. eDirectory then handles all the details to complete the operation. Unaware of the server-to-server operations, the client assumes that the first server completed the request. This process is called chaining.</p> <p>While chaining has a fair share of advantages, a high value of this measure could also mean:</p> <ul style="list-style-type: none"> <li>• One/more clients might have to wait for feedback while the server chains to resolve the same</li> <li>• If the operation requires the LDAP server to send many entries across a WAN link, the operation might be very time consuming.</li> <li>• If several servers are equally capable of progressing the operation, different servers might process two requests to operate on the same entry.</li> </ul>
Requests that could not serviced	Indicates the number of requests that could not be	Number	A partially serviced operation will not be counted as an error. The

Measurement	Description	Measurement Unit	Interpretation
because of errors	serviced due to errors other than security errors, and referrals since the last measurement period.		errors include naming-related, update-related, attribute related, and service-related errors. Ideally, the value of this measure should be 0.
Replication updates in	Indicates the number of replication updates fetched or received from eDirectory servers since the last measurement period.	Number	<p>The Novell Import Conversion Export utility uses the LDAP Bulk Update/Replication Protocol (LBURP) to send asynchronous requests to an LDAP server. This guarantees that the requests are processed in the order specified by the protocol and not in an arbitrary order influenced by multiprocessor interactions or the operating system's scheduler. LBURP also lets the Novell Import Conversion Export utility send several update operations in a single request and receive the response for all of those update operations in a single response. This adds to the network efficiency of the protocol.</p> <p>The LBURP processor in eDirectory also commits update operations to the database in groups to gain further efficiency in processing the update operations. LBURP can greatly improve the efficiency of your LDIF imports over a traditional synchronous approach.</p>
Replication updates out	Indicates the number of replication updates sent to or taken by eDirectory servers since the last measurement period.	Number	
Incoming traffic	Indicates the incoming traffic on the interface. This will include requests from DUAs as well as responses from other eDirectory servers.	KB	
Outgoing traffic	Indicates the outgoing traffic on the interface. This will	KB	



Measurement	Description	Measurement Unit	Interpretation
	include responses to DUAs and eDirectory servers as well as requests to other eDirectory servers.		

## About eG Innovations

eG Innovations provides intelligent performance management solutions that automate and dramatically accelerate the discovery, diagnosis, and resolution of IT performance issues in on-premises, cloud and hybrid environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, from virtualization to cloud, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations is dedicated to helping businesses across the globe transform IT service delivery into a competitive advantage and a center for productivity, growth and profit. Many of the world's largest businesses use eG Enterprise to enhance IT service performance, increase operational efficiency, ensure IT effectiveness and deliver on the ROI promise of transformational IT investments across physical, virtual and cloud environments.

To learn more visit [www.eginnovations.com](http://www.eginnovations.com).

### Contact Us

For support queries, email [support@eginnovations.com](mailto:support@eginnovations.com).

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