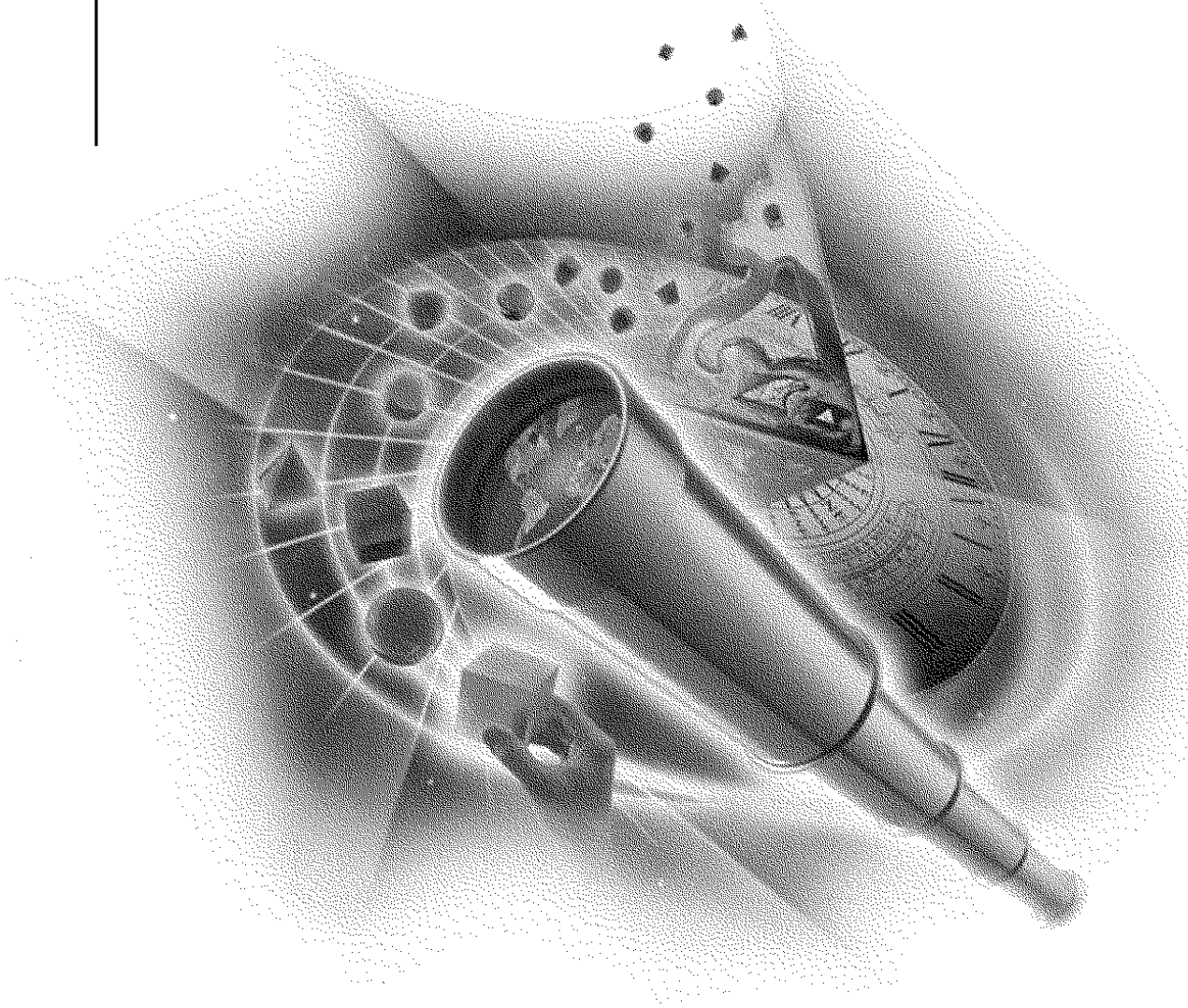


VERSION 2.0

Global Event Services
Administrator Guide



Synchronicity[™]
NETWORK DIRECTORY INTEGRATION SOFTWARE

Novell[®]

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U.S. Patent No. 5,721,825 protects NetVision's Global Event Services.

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Overview

This section contains the following information:

- “Product Overview” on page v
- “Product Components” on page v
- “Additional Documentation Resources” on page vii

Product Overview

Global Event Services™ for NetWare® is an innovative service that runs on NetWare 4.10 or later. Global Event Services provides real-time notification of events to any location on the network that has sufficient rights granted. These events include any user-definable events and all NDS™ events. Server-centric NDS events are serviced through Global Event Services to provide a quick, reliable, scalable and secure mechanism for synchronizing external databases with NDS. Events are monitored only when clients register for the events. This document provides the necessary information to properly operate and troubleshoot problems with Global Event Services.

Installation of Global Event Services and its components is performed by the Synchronicity installation process. The Global Event Services Broker is optionally loaded by the installation process.

Product Components

Global Event Services has two components. The first is the Global Event Services Broker (NVGES.NLM). The second component is the NetWare Administrator snapin for Global Event Services. The snapin is not required for Global Event Services to function properly.

The Global Event Services snapin allows Global Event Services global configuration management. Management through the snapin affects all Global Event Services Broker NLM™ programs. Global management includes viewing Global Event Services and Global Event Services events rights assignments.

The Global Event Services Broker NLM allows server management, configuration, and monitoring of the Global Event Services system (all local) to the server on which it is loaded. The deployment of this NLM is described in the *Overview and Installation* guide. Configuration management allowed through the Global Event Services Broker NLM affects only that local server and the Global Event Services clients attached to that server. The configurable options include connection time-outs, log file sizes, memory usage settings, and other items that are likely to be set on a per-server basis.

Component	Description
Global Event Services Broker (NVGES.NLM)	A NetWare® Loadable Module™ (NLM™) for NetWare 4.1 and later that provides event notification as changes are made to NDS™.
Global Event Services snapin	Allows Global Event Services global configuration management from 32-bit NetWare Administrator for Windows 95/98 and Windows NT and Win32.

What's New in Version 2.0?

Global Event Services version 2.0 has the following features not found in previous versions:

- All packets are in Unicode.**
- Global Event Services 2.0 is TCP/IP enabled.

Additional Documentation Resources

For additional information, see the following resources:

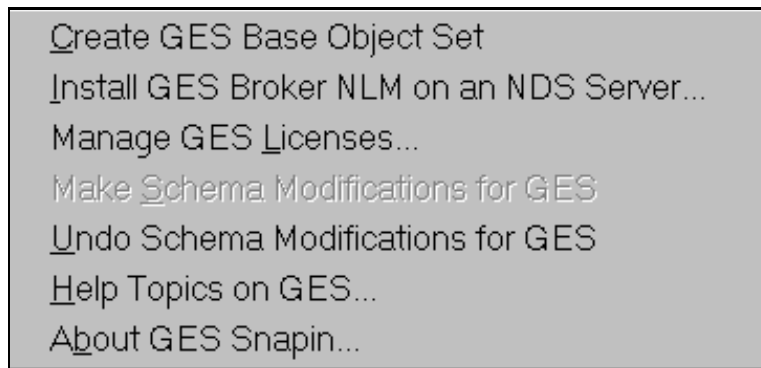
To learn more about	See
The installation process that is common to all Synchronicity products	<i>Synchronicity Overview and Installation Guide</i> . This document can be found in electronic form on the CD-ROM or on the NetVision web site, http://www.netvision.com .
The procedures to get started installing the Synchronicity products right away	<i>Quick Starts</i> . This document can be found in electronic form on the product CD-ROM or on the NetVision web site, http://www.netvision.com .
Details about using Synchronicity	Online help. Online help for the Synchronicity product is available within NetWare Administrator. To access Help, select Tools > Synchronicity Product > Help Topics on Synchronicity Product from the NetWare Administrator menu bar. You may also click Help within any dialog for context-sensitive help.
The configuration and operation of the Global Event Services Broker NLM	<i>Global Event Services Administrator Guide</i> . This document can be found in electronic form on the product CD-ROM or on the NetVision web site, http://www.netvision.com .
Vital program information such as changes to the program, files, or documentation	Readme files.

1 **Global Event Services NetWare Administrator Snapin**

NetWare Administrator Menus

When the Global Event Services™ snapin is installed for NetWare® Administrator, a menu item is added to the Tools menu—Global Event Services (GES). (See Figure 1-1.) The six submenu items are described below.

Figure 1-1
Global Event Services Menu



Create Global Event Services Base Object Set

This item will recreate the Global Event Services container and all subordinate events such as the predefined DSE events. This is helpful if a system error occurred during installation or if an administrator inadvertently deletes one or more of the objects. See “Make Schema Modifications for Global Event Services” on page 3 of this chapter.

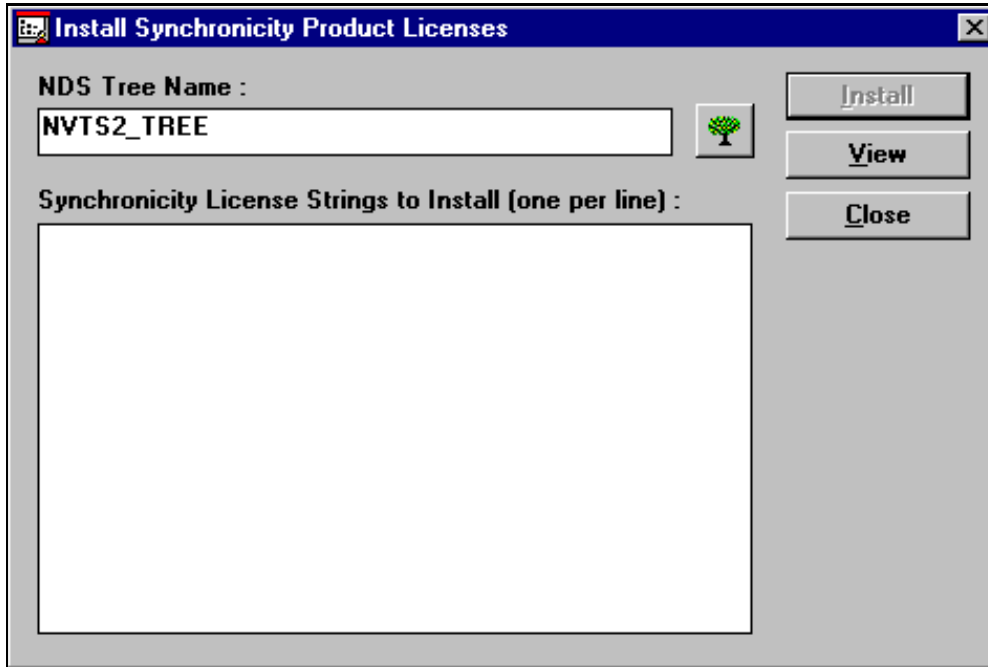
Install Global Event Services Broker NLM on an NDS Server

The first installation of the Global Event Services Broker NLM on an NDS™ Server takes place during a successful installation. However, you may need to install other instances of Global Event Services when new NetWare servers are

added to the tree. This menu item lets you copy the Global Event Services NLM to any location on the network.

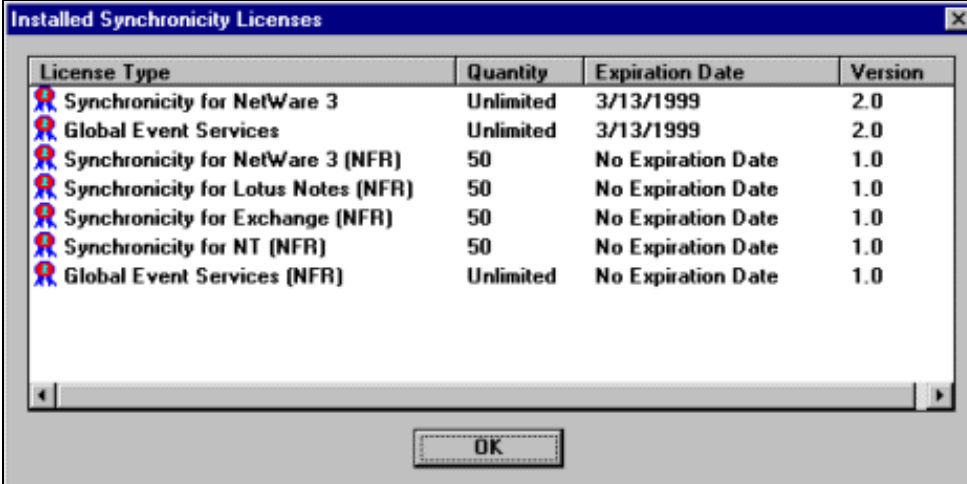
Manage Global Event Services Licenses

Figure 1-2
Global Event Services Upgrade License



This item lets you install new Global Event Services licenses into the system and view existing licenses. Global Event Services comes with a thirty-day evaluation license. The product is fully featured but will expire at the end of the evaluation period. After you have obtained a license and installed it, the new license will override the evaluation license, preventing any termination of use. No reinstallation of Global Event Services is required in this case.

Figure 1-3
Global Event Services View Licenses



License Type	Quantity	Expiration Date	Version
Synchronicity for NetWare 3	Unlimited	3/13/1999	2.0
Global Event Services	Unlimited	3/13/1999	2.0
Synchronicity for NetWare 3 (NFR)	50	No Expiration Date	1.0
Synchronicity for Lotus Notes (NFR)	50	No Expiration Date	1.0
Synchronicity for Exchange (NFR)	50	No Expiration Date	1.0
Synchronicity for NT (NFR)	50	No Expiration Date	1.0
Global Event Services (NFR)	Unlimited	No Expiration Date	1.0

Make Schema Modifications for Global Event Services

This item makes all schema modifications. Appropriate administrator privileges are necessary to modify the NDS schema. (See “Create Global Event Services Base Object Set” on page 1.) After the Global Event Services snapin is installed and NetWare Administrator is loaded, the Global Event Services snapin will prompt for installation of Global Event Services if it is not detected. If the primary tree is not the tree in which Global Event Services is being installed, this option allows Global Event Services to be installed in a different tree. The primary connection of the client should be changed to the target server and NDS tree before executing this option.

Undo Schema Modifications for Global Event Services

This option will uninstall Global Event Services schema modifications. The NDS requests are made to the server and NDS tree that are set in the primary connection of the client. It may be necessary to delete all Global Event Services objects including the Global Event Services container.

Help on Global Event Services

This item will display help on the Global Event Services. This is a standard Windows help file.

About Global Event Services Snapin

This menu item simply displays the version of the Global Event Services Snapin. This version is helpful when receiving technical support.

Global Event Services Event Container

The Global Event Services installation process will create a Global Event Services container subordinate to [Root] within the NDS tree. See Figure 1-4. All event types and an administrator user used by the Global Event Services Broker (NVGES.NLM) are stored in this container. With the Global Event Services NetWare Administrator snapin installed, details of these objects can be examined. Due to NDS synchronization latency, changes can sometimes take several minutes to be reflected.

Global Event Administrator

This user account has administrator privileges for the Global Event Services container. The NVGES.NLM logs into NDS as this user. This ensures that Global Event Services takes full advantage of NDS's rich security mechanism. In addition, this user account allows the network administrator full control of Global Event Services.

NDS Events

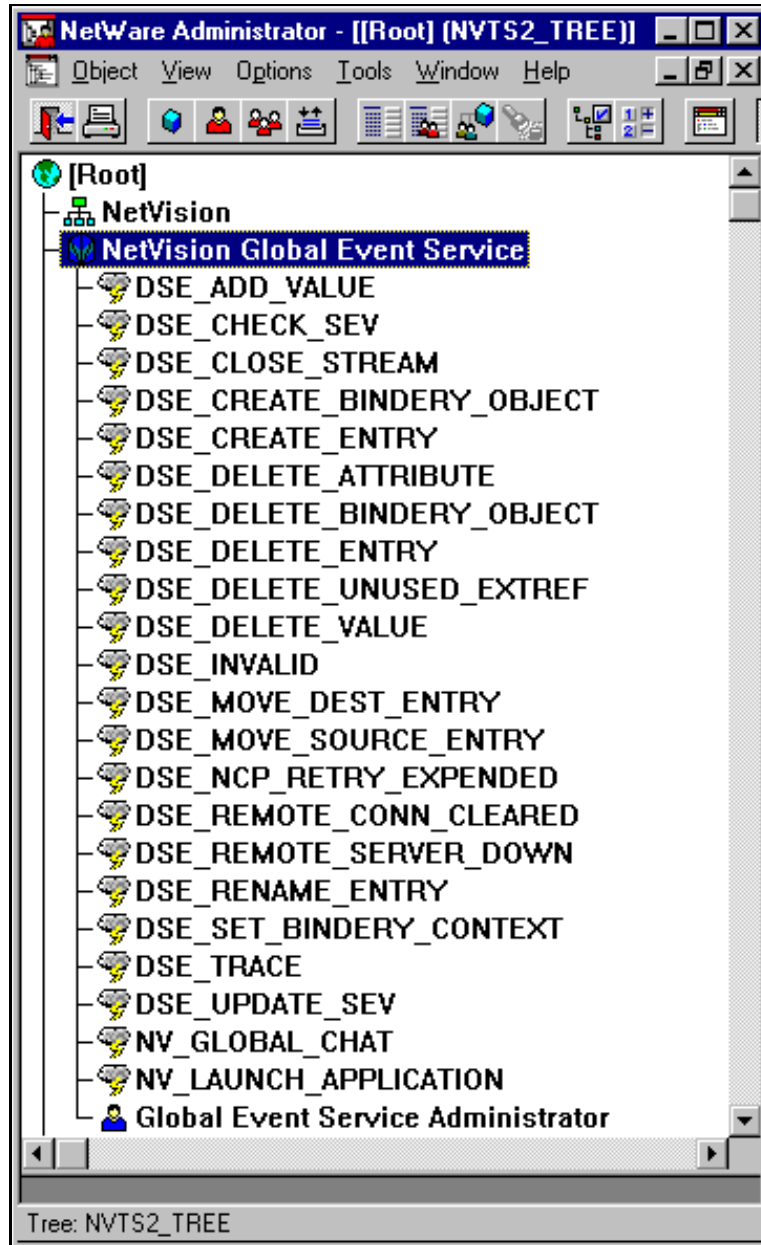
Global Event Services for NetWare also supports all Novell® Directory Services™ Events. These events begin with "DSE." The DSE events allow specific changes within NDS to be sent to remote applications. Some DSE events report internal NDS activity, which is useful for observing NDS behavior and monitoring network performance. Only NDS can fire DSE events. This ensures no security violations via proxy.

Custom Events

Custom events are created by the user. In the following figure, two Synchronicity custom events are present: NV_GLOBAL_CHAT and NV_LAUNCH_APPLICATION. Applications must be written to manage these custom events. The Global Event Services API is used to create these applications. There is no restriction as to the nature of the events created.

Events can be used for specific notification, general broadcast, or specialized communications.

Figure 1-4
Global Event Services Container



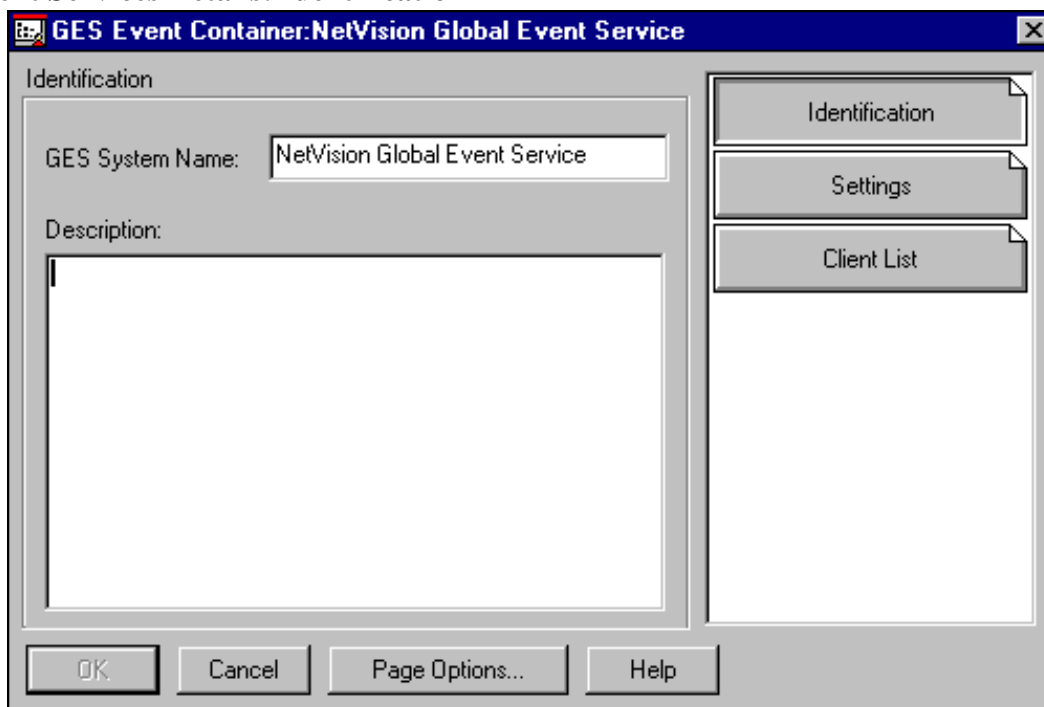
Global Event Services Container Details

The Global Event Services container (CN=GES) is located directly below [Root]. Right-click on this object and select Details to display the event information. There are three pages of details for this object: Identification, Settings, and Client List (see Figure 1-5, Figure 1-6, and Figure 1-7).

Global Event Services Container - Identification

The identification page displays the Global Event Services name and a description. The Global Event Services name is the name of the event container. The description allows an administrator to write information that may be useful to other administrators or users. If you need to know the version of the Global Event Services snapin, click Tools > Global Event Services > About Global Event Services Snapin.

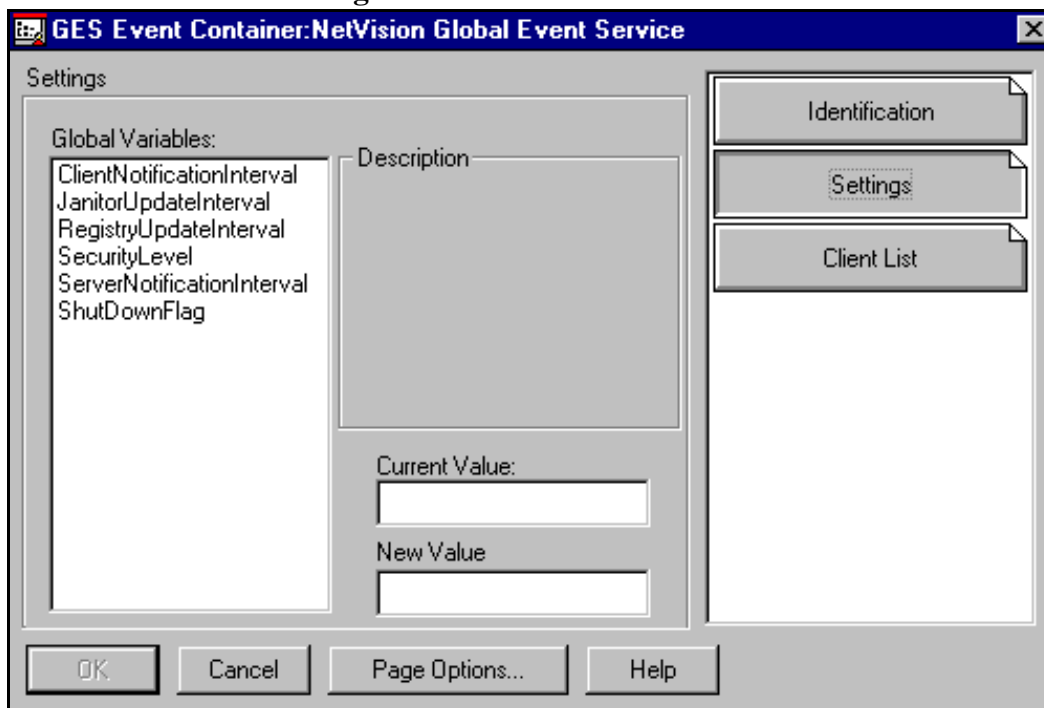
Figure 1-5
Global Event Services Details: Identification



Global Event Services Container - Settings

This page (“Global Event Services Details:Settings” on page 7) allows custom configuration of global Global Event Services settings. These global configuration settings are read by all Global Event Services Broker NLMs (NVGES.NLM). Local configuration settings on a per-server basis can also be set. For local configuration settings, see “General Information Window” on page 19.

Figure 1-6
Global Event Services Details:Settings



- **ClientNotificationInterval** - This interval allows for periodic update of client notifications. The Global Event Services Broker will store events for the number of seconds identified by this interval. When this interval time has been reached, clients will be notified that events are waiting for delivery. When selecting this interval it is important to balance idle CPU time with valuable memory required for storing events. Upon installation this parameter is optimally configured.
- **JanitorUpdateInterval** - This interval specifies the number of seconds between each internal check. Items such as client communication links and remote server connections are checked. If a client connection has been lost, the registry is cleaned up. If a connection to a remote server has not been used within the time specified, the connection will be closed. The Server Connection Time-out is a local configuration setting. For

local configuration settings, see “General Information Window” on page 19.

- **RegistryUpdateInterval** - This interval activates the process which detects changes to Global Event Services event registrations throughout the network. Once the changes to Global Event Services are detected, the local server will add or remove monitoring for those events. This process improves server and network performance by monitoring only desired events.
- **SecurityLevel** - Global Event Services uses all the power and flexibility of NDS’s security system. Due to the sensitive nature and timing of network events, Global Event Services has three additional levels of security checking. These security levels are defined as follows:
 - Security Level 1: This basic security resolves the NDS distinguished name of the client associated with this server connection only on login, although rights must be present for additional register requests. This level of security does not prevent a client connection (and associated DN) from being replaced by another client (friendly or hostile).
 - Security Level 2: In addition to security level 1, all client requests are verified for authenticity. That is, each request is checked to ensure the user is the same as the one that was verified upon Global Event Services login. This security level ensures that the client connection on this server is a logged-in and authenticated NDS connection. Each request made by the client is verified for this authentication. Requests to register, unregister, fire, and get events are first verified within NDS for proper rights. Once allowed access to the system, all events are allowed until the user logs out of the system.
 - Security Level 3: This security level does all that security level 2 does. In addition, it performs an NDS rights check on each operation. This includes each "get event" request by the client. This additional security allows administrators to revoke rights within NDS and be ensured that clients already registered for those events will be denied any further access.
- **ServerNotificationInterval** - Similar to ClientNotificationInterval, this interval allows for periodic delivery of events to remote servers. The Global Event Services Broker will store events for the number of seconds identified by this interval. When this interval time has been reached, remote servers that have requested these events on behalf of their

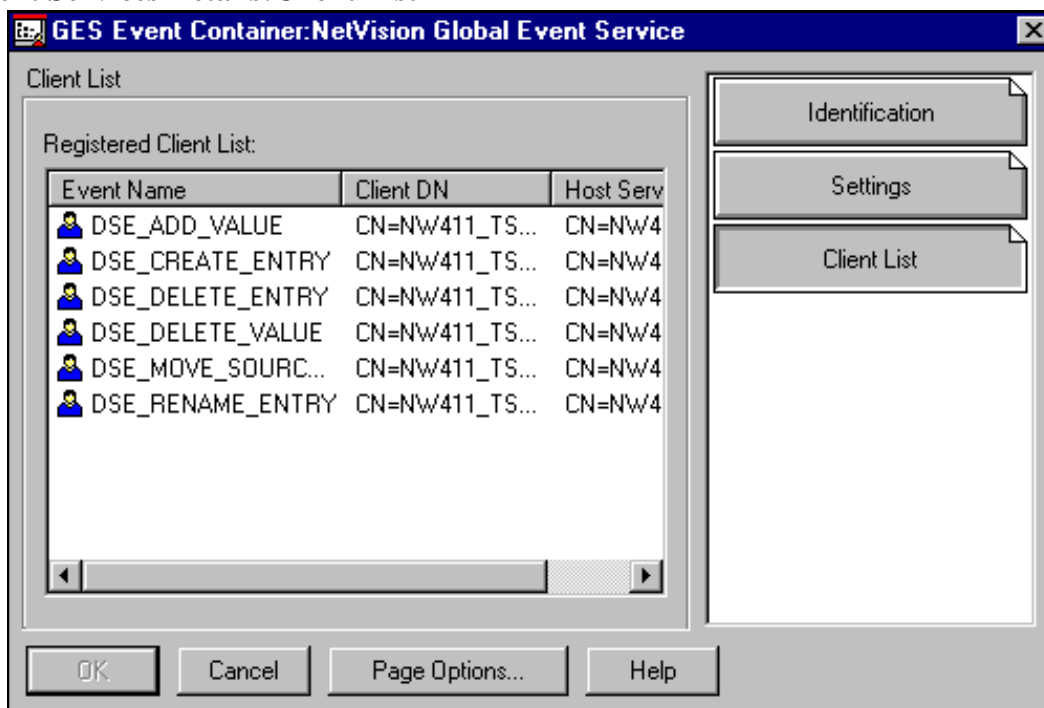
connected clients will have all available events delivered. When selecting this interval it is important to balance idle CPU time with valuable memory required for storing events. Upon installation this parameter is optimally configured.

- **ShutDownFlag** - Setting this flag to 1 will cause Global Event Services to shut down across the entire network. All Global Event Services Broker (NVGES.NLM) programs will be unloaded and all client communications with this application will be abruptly terminated. This shutdown flag is intended to allow a single method to disable Global Event Services throughout the network.

Global Event Services Container - Client List

This page (see Figure 1-7) displays all NDS users that have registered for events. Many times while running a Global Event Services-enabled application, several events will automatically be registered while the user application is active. The Registered Client List also displays the events a user has registered for and the server to which the request has been sent.

Figure 1-7
Global Event Services Details:Client List



Global Event Services Event Details

All Global Event Services events are stored in the Global Event Services container. Events can be individually registered, unregistered, and fired. Access to each event can also be individually managed. Following are descriptions of the pages available when selecting details on a Global Event Services event.

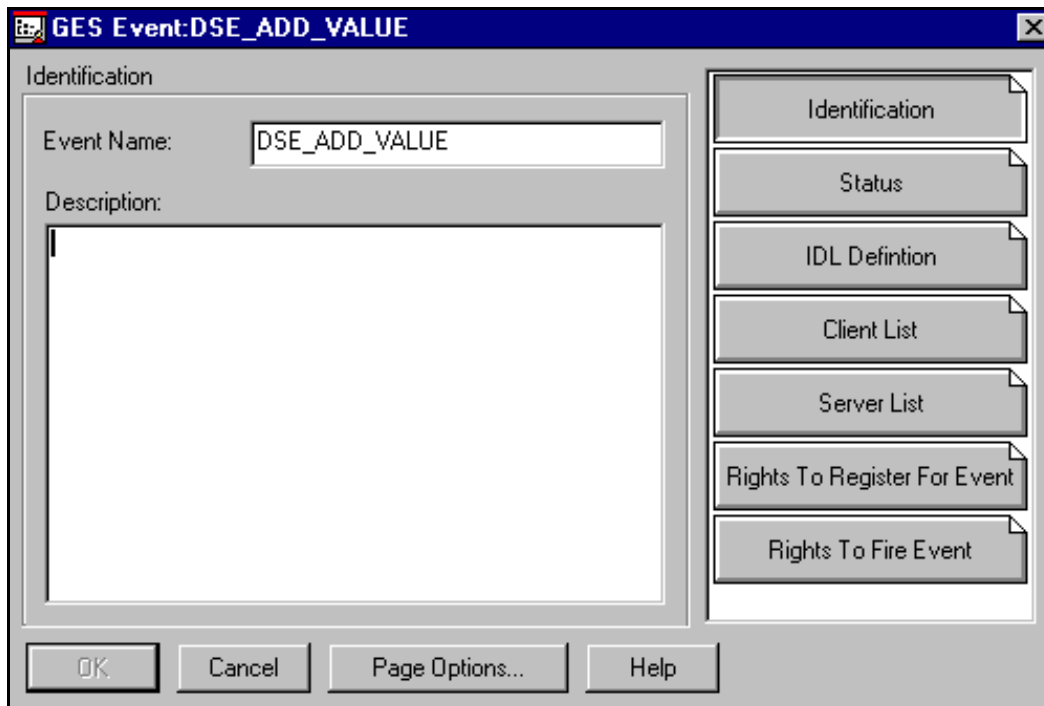
Global Event Services events are types of events and do not store data associated with the occurrence of the event.

Global Event Services Event - Identification

The identification page (“Global Event Services Event:Identification” on page 11) displays the event name and a brief description. Since events can be created dynamically, their use and interpretation (IDL Definition) can evolve.

For information on the IDL Definition, see “Global Event Services Event - IDL Definition” on page 13.

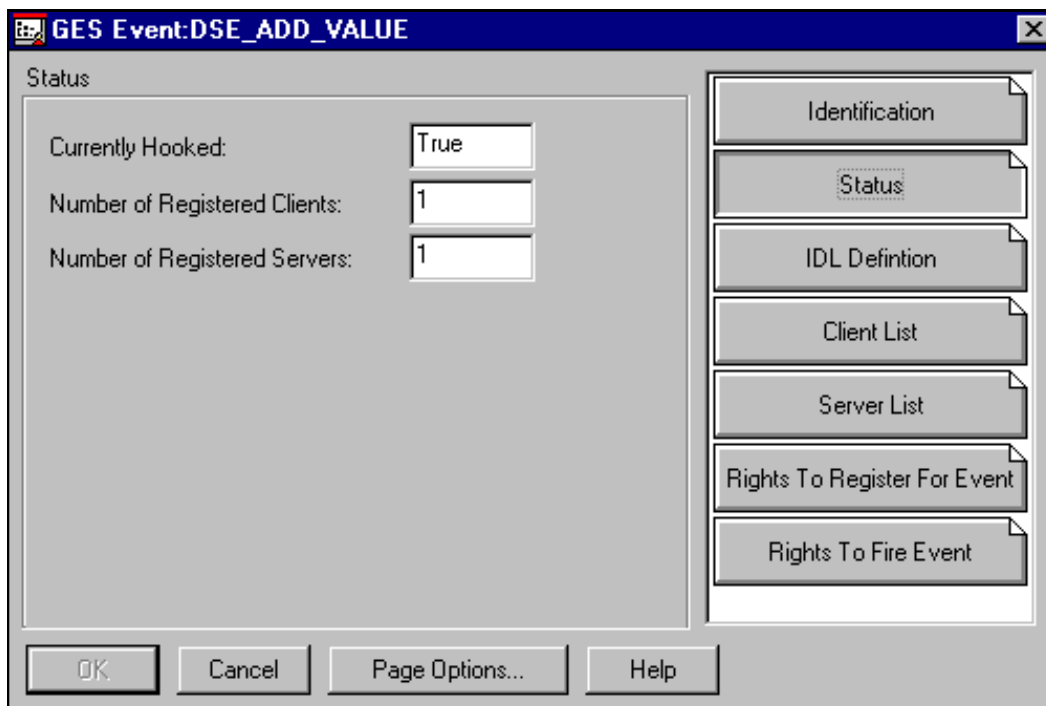
Figure 1-8
Global Event Services Event:Identification



Global Event Services Event - Status

The status page (“Global Event Services Event:Status” on page 12) identifies whether someone is currently registered for the event. If so, the Currently Hooked field will have a True value. Otherwise the value will be False. The Number of Registered Clients identifies how many clients (users) are requesting notification of this event. The Number of Registered Servers identifies the number of servers to which these clients are connected. Since Global Event Services events are efficiently routed to the servers connected to the clients registered for the events, this value indicates exactly how many servers need the event.

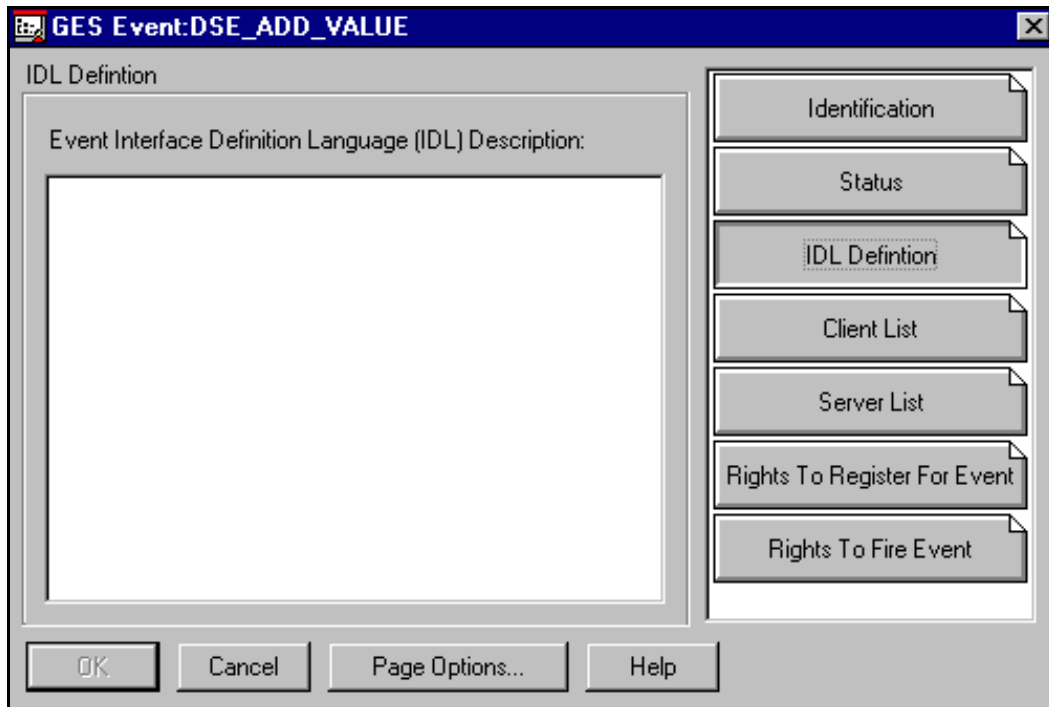
Figure 1-9
Global Event Services Event:Status



Global Event Services Event - IDL Definition

The Interface Description Language (IDL) definition (see Figure 1-10) is available for user-defined events. This allows a custom implementation to generically define the data accompanying the event. This field is optional but useful when run-time interpretation of unknown events is expected. There is no restriction for the description of data types within this field (IDL is not required).

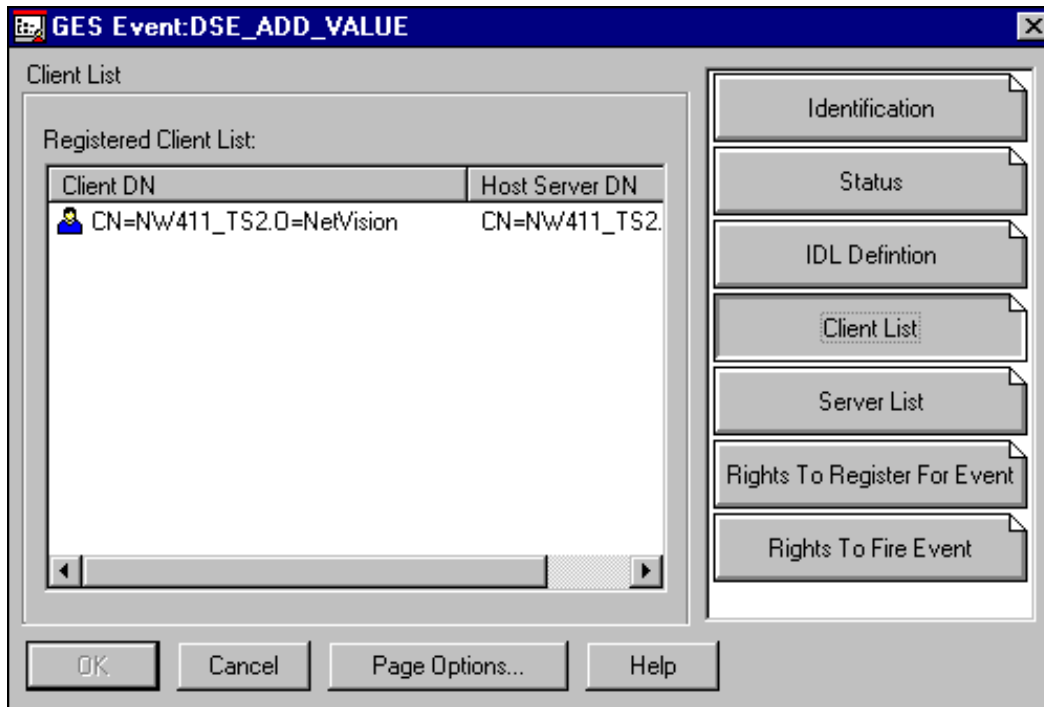
Figure 1-10
Global Event Services Event: IDL Definition



Global Event Services Event - Client List

The Client List page (see Figure 1-11) identifies the NDS distinguished name of the user that has registered for this event. The Host Server DN is also specified. This is the DN of the server the client is attached to and is making Global Event Services requests from.

Figure 1-11
Global Event Services Event: Client List

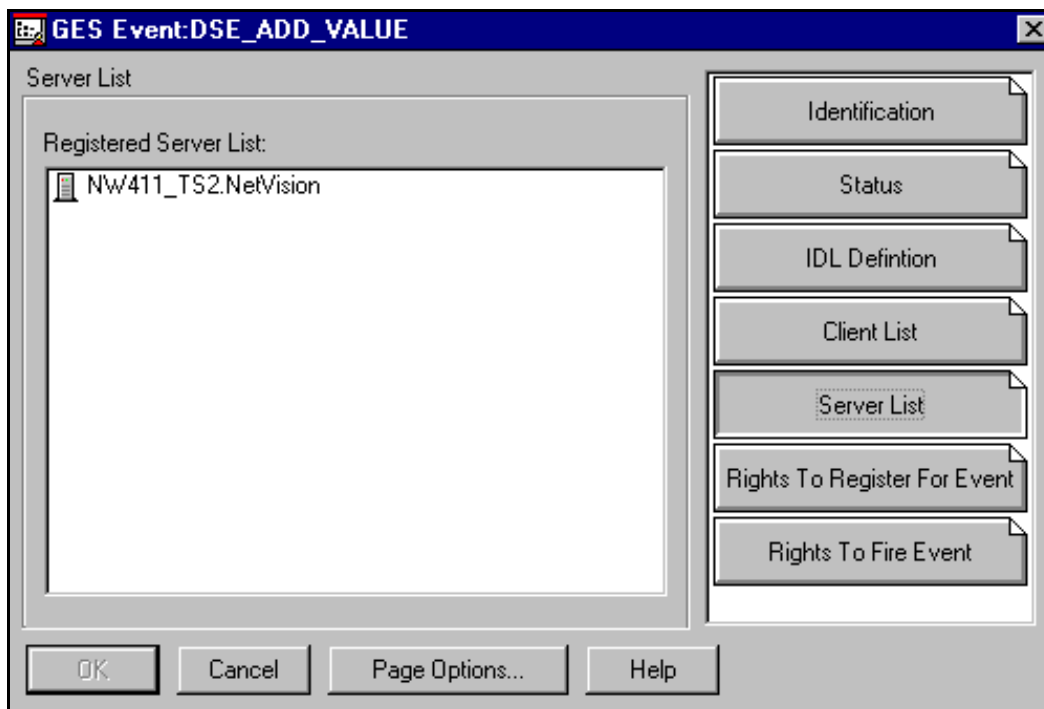


Global Event Services Event - Server List

The Server List page (see Figure 1-12) identifies the server name of all servers the clients are attached to and are making Global Event Services requests from. All events of this type will eventually propagate to each server in the list.

Figure 1-12

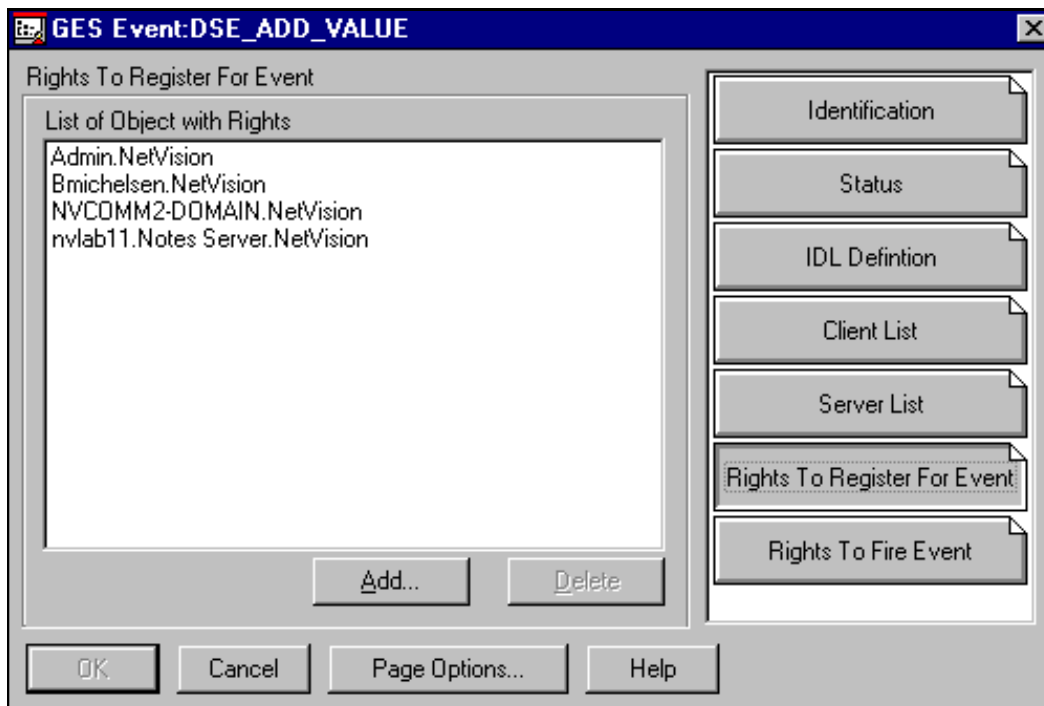
Global Event Services Event: Server List



Global Event Services Event - Rights To Register For Event

This page (see Figure 1-13) lets an administrator assign rights that give other users and groups access to this event. Rights can be assigned like any other NDS right or ACL by granting Write rights for a User, Group, or container to the NetVisn:Register for Event attribute of this event object.

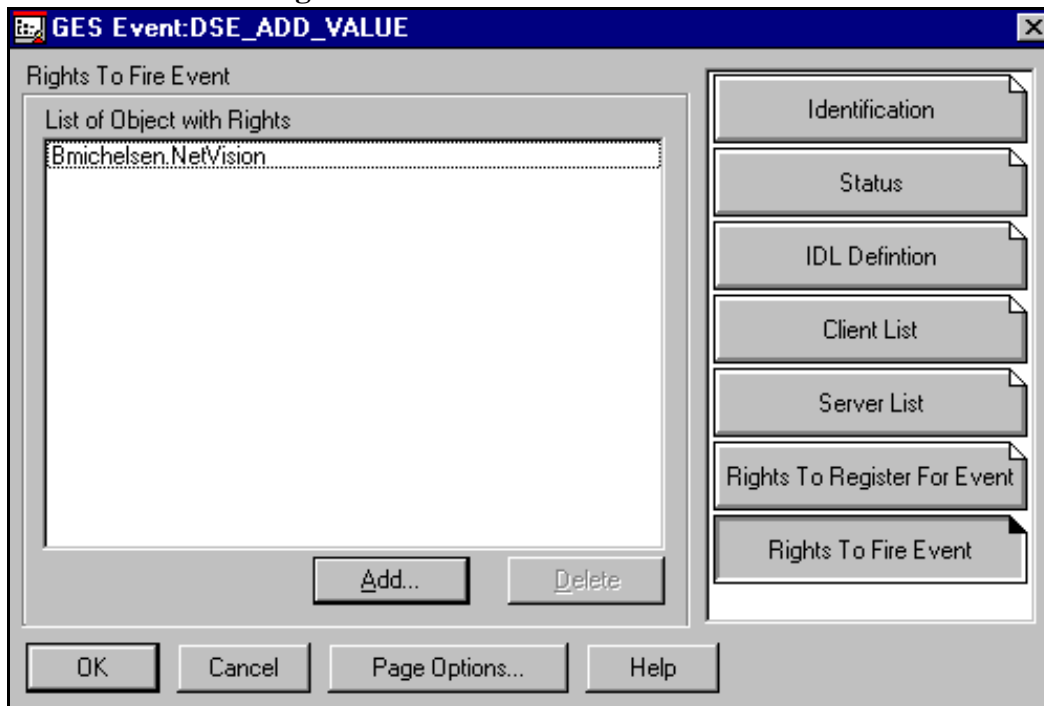
Figure 1-13
Global Event Services Event: Rights to Register
for Event



Global Event Services Event - Rights To Fire Event

This page (see Figure 1-14) lets an administrator assign rights that give other users and groups access to fire this event. Rights can be assigned like any other NDS right or ACL by granting Write rights for a User, Group, or container to the NetVisn:Fire Event attribute of this event object. Note that NDS events (events beginning with "DSE") cannot be fired. Only custom or user-defined events can be fired (triggered).

Figure 1-14
Global Event Services Event: Rights to Fire Event



2 **Global Event Services™ Broker NLM**

When running in Mode 1, the Global Event Services™ Broker NLM™ (NVGES.NLM) should be loaded on every NetWare® 4.x server in the tree with at least a read/write replica. If NDS™ modifications are made to replicas existing on a server that is not running the Global Event Services Broker, events will be lost. But if changes to NDS only occur on servers running the Global Event Services Broker, events will be received.

The rest of this chapter explains the General Information Window, which lets you view the current settings for Global Event Services.

General Information Window

The display window shows the status of this Global Event Services Broker. The fields are updated every second. Each item in the window is defined briefly below the following figure (Figure 2-1).

Figure 2-1
Main Menu



Local Users identifies the number of clients connected to this server that have logged in to Global Event Services.

Maximum concurrent users. This counter tracks the maximum number of clients that were simultaneously logged into Global Event Services.

DSE events in queue. The DSE events queue is a queue of NDS events received from Novell® Directory Services™ Event System. This local NDS event system is available on each NetWare 4.x server. All of these events need to be translated. After translation these events are placed in the Global Event Services Events Queue. See "Global Event Services Events in queue" below.

Maximum DSE events queued. This is the maximum number of DSE events that were queued at any time.

Global Event Services Events in queue. These are translated NDS events (or custom events) that are awaiting delivery or pickup by both clients and remote servers. Since NDS events have local identification numbers and need translation, corresponding Global Event Services events require more memory. It is also possible that more than one client has requested this event. In this case events are retained until all clients and remote servers have received the event.

Maximum Global Event Services events queued. This is the maximum number of Global Event Services events that have been queued at any time.

Memory in use (KB). This indicates the amount of memory used by the Global Event Services Events Queue.

Maximum memory used (KB). This indicates the maximum amount of memory used by the Global Event Services Events Queue at any time.

Global Event Services Broker Mode. This mode can have values of 1, 2, or 3. The Broker mode determines how Global Event Services handles NDS events. These modes are described in detail in the *Overview and Installation Guide*. The default mode is 1. The mode can be set when loading the NLM by adding to the command line `/mode=n` where `n = 1, 2, or 3`. For example, to load Global Event Services Broker in mode 2, type `load nvges /mode=2`.

Available Options. The main menu (Available Options) lets you select options that display details. The General Information window is displayed, including the server name. The counters within the General Information window can be reset to zero. Help is available at any time.

Help Key. Pressing F1 accesses the online help for the NLM. This key can be pressed at any time.

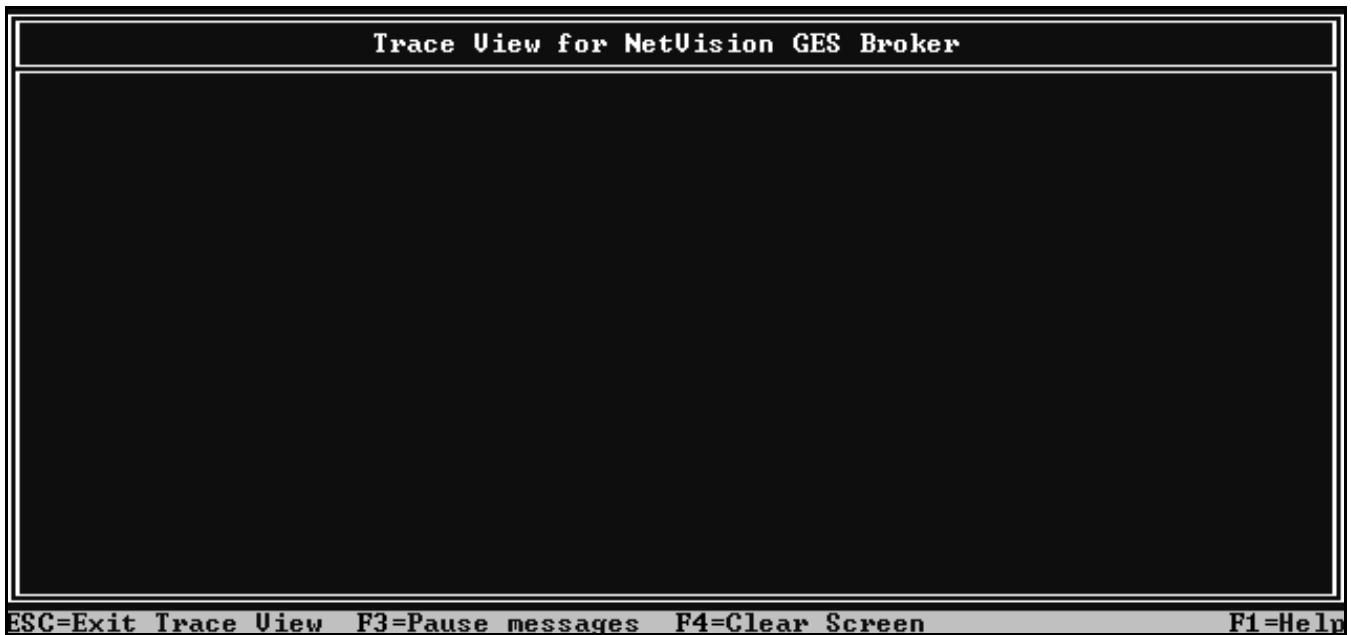
Reset Counters. Pressing F2 will set the following fields to zero: Maximum DSE events queued, Maximum Global Event Services events queued, and Maximum memory used (KB).

Main Menu Options

Click any option in the Available Options menu to display detailed information about that option. Each option is briefly described below.

View Trace. The Trace View window (see Figure 2-2) displays all messages selected in the Trace Options window. Messages can be paused and resumed with the F3 key. The F4 key will clear the screen. Pressing the ESC key will return to the main menu. Note that incoming events from remote servers are being received in an internal burst mode. When this occurs, pressing the F3 key to pause will not immediately pause the messages. All remote server events must first be received.

Figure 2-2
View Trace



Trace options (see Figure 2-3) lets you select the types of messages that are displayed within the View Trace window when it is active. These messages can be used for informational and troubleshooting purposes. If it is used for troubleshooting, the log file should be enabled on specific message types for later viewing.

Figure 2-3
Trace Options



There are four types of View Trace messages. The following table lists the message types, descriptions, and their effect on system performance.

View Trace Message Type	Description	Effect on System Performance
Detail	All information available on all events	Heavy
Informational	Event transmission activities, remote server communications, client (application) requests	Moderate
Warnings	Conditions that should be known by operator, such as loss of data or events.	Light
Errors	Errors and severe conditions that should be resolved immediately	Extremely Light

Log File Options. This window (see Figure 2-4) lets you select from four options for log file output of Global Event Services messages.

Figure 2-4

Log File Options



Log File Filename (under Log File Options) identifies the name and location of the log file. The default is SYS:SYSTEM\NUGES.LOG. The current size of the log file is displayed. The maximum file size can be specified. The default is 5,000,000 bytes. Resetting the log file will clear the log file and then write a description to it. This description is the reason the log file is approximately 162 bytes long after resetting it.

The table below lists the Log File message types, descriptions, and their effect on system performance.

Log File Message Type	Description	Effect on System Performance
Detail	All information available on all events	Extremely Heavy
Informational	Event transmission activities, remote server communications, client (application) requests	Moderate
Warnings	Conditions that should be known by operator, such as loss of data or events.	Light
Errors	Errors and severe conditions that should be resolved immediately	Extremely Light

Global Configuration. This display (see Figure 2-5) shows the Global Event Services configuration that is the same throughout the NDS tree. For information on changing the values, see “Global Event Services Container - Settings” on page 7.

Figure 2-5
Global Configuration

```

Global Configuration
Security Level: 2
Registry Update Interval (seconds): 10
Server Update Interval (seconds): 1
Client Notification Interval (seconds): 1
Janitor Activation Interval (seconds): 30

```

Server Configuration. Along with this server’s NetWare version, this option displays and allows you to edit six Global Event Services server parameters (see Figure 2-6).

Figure 2-6
Server Configuration

```

Server Configuration
Novell NetWare 4.11
Max GES Event Queue Memory Allowed (bytes): 10000000
Low Server Memory Use Limit (bytes): 1000000
Server Connection Timeout (seconds): 300
Client Connection Timeout (seconds): 120
Max Server Attachment Retries: 10
Max Remote GES Attachment Retries: 10

```

- *Max Global Event Services Event Queue Memory Allowed (bytes)* - default 5,000,000. This sets the maximum amount of memory that can be used for the Global Event Services event queue. If the limit is reached then events are discarded. If the events are used for synchronization then some applications will not be notified of some modifications. A resynchronization would need to be scheduled.
- *Low Server Memory Use Limit (bytes)*. Regardless of the Max Global Event Services Event Queue Memory Allowed (bytes), the remaining memory available on the server, as defined by this low server memory field, will not be used by the Global Event Services Broker. For example,

suppose the Low Server Memory Use Limit is set to 1 MB. When available server memory falls below 1 MB, Global Event Services events are discarded. If the events are used for synchronization then some applications will not be notified of some modifications. A resynchronization would need to be scheduled.

- *Server Connection Timeout.* Connections established to Global Event Services Brokers located on other NDS servers will be removed if no activity occurs on the connection for the amount of seconds specified.
- *Client Connection Timeout.* Connections to client applications that do not respond within the time specified will be removed. Upon connection termination and subsequent logout of Global Event Services, client applications are required to login again and reestablish a connection.
- *Max Server Attachment Retries.* Heavy server and network load conditions can sometimes cause connection failures. This option allows configuration of the server attachment retry feature. Connections to remote NetWare servers will be attempted the number of times specified in this setting. The default setting is 10.
- *Max Remote Global Event Services Attachment Retries.* Heavy server and network load conditions can sometimes cause Global Event Services connection failures. A Global Event Services connection is actually a NetWare NCP Extension based upon an established server connection. A Global Event Services connection can also be lost if the Global Event Services NLM is unloaded during frequent Global Event Services-to-Global Event Services communications. This option allows configuration of the server attachment retry feature. Connections to remote NetWare servers will be attempted the number of times specified in this setting. The default setting is 10.

About NVGES. This main menu option displays the following information:

- Copyright, version, and date information for the Global Event Services Broker (see Figure 2-7)
- The Client Remote Access API version (used by client Global Event Services applications)
- The Server Remote Access API version (used by other servers)
- The Audit Remote Access API version (used by Global Event Services management utilities)
- The NDS Global Event Services Schema and Configuration version (the version of the Global Event Services modifications that were made to this NDS tree)

Figure 2-7

About NVGES

```

About NetVision GES
NetVision GES Broker
Copyright (C) 1996-1999 NetVision, Inc.
All rights Reserved.
U.S. Patent 5,721,825. Other patents pending.
Version: 2.0.56 (BETA 1) 2/26/1999
Client Remote Access API version: 0.20.1
Server Remote Access API version: 0.30.1
Audit Remote Access API version: 1.6.0
NDS GES Schema/Configuration version: 2.0

```

Exit NVGES. Selecting this main menu option will prompt for confirmation to exit the NLM (see Figure 2-8). All clients registered on this server will be unregistered and logged out of Global Event Services. Communication links to these client Global Event Services applications will be abruptly terminated. The Global Event Services Broker NLM will unload.

Figure 2-8
Exit NVGES

