nABLE VOD System Management Application

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Abstract

nABLE is nCUBE's Video on Demand (VOD) system management application. nABLE consists of a suite of server applications for end-to-end VOD systems administration. nABLE provides a complete set of VOD system management capabilities, including:

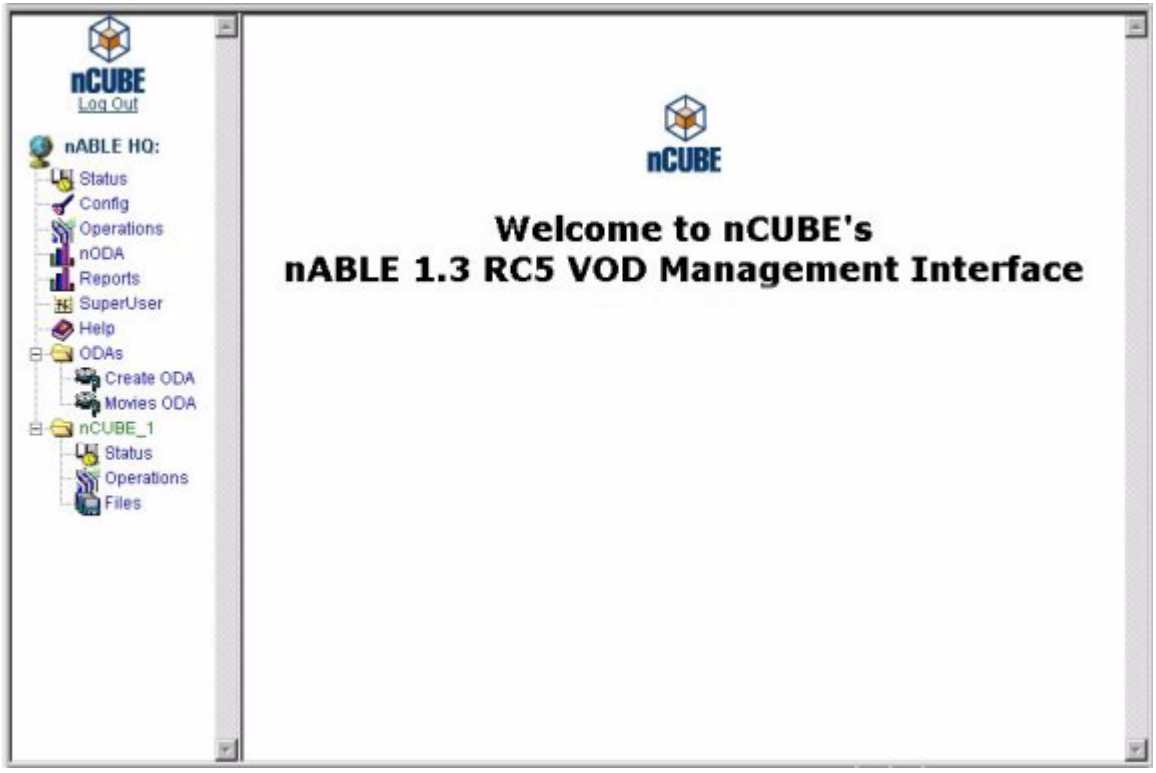
- Monitoring and administration of all VOD system operations
- Controlling and managing video servers and content files
- Defining and managing On-Demand Applications (ODA)
- Managing network bandwidth and load-balancing network resources
- Provisioning and storing system configuration data
- Providing standard Application Program Interfaces (APIs) for seamless integration with On-Demand Applications (ODA), Subscriber Management and Billing Systems, and Conditional Access Systems (CAS)

The browser-based user nABLE interface provides a single point of access to all of nABLE's functional capabilities — even across large-scale distributed deployments. This paper describes VOD system management and administration with nABLE.

nABLE Overview

The nABLE management interface is an HTML-based application that can be accessed by authorized users on any network-attached machine running the Microsoft Internet Explorer 5.0 browser.

nABLE is a secure system, employing password protection for all users, as well as supporting all back-end database and network security implements.



nABLE is a complete VOD system management application, giving operators a single-point of access to:

- Check system status and operations

- Manage and distribute content files on n4 video servers
- Define On-Demand Application (ODA) assets and asset collections
- Configure and manage network resources
- Generate system usage reports
- Access online Help

The nABLE User Interface

nABLE supports a browser-based thin client for complete VOD systems management and administration. Currently, nABLE supports Microsoft Internet Explorer version 5.0 or higher.

The nABLE User Interface consists of three primary windows:

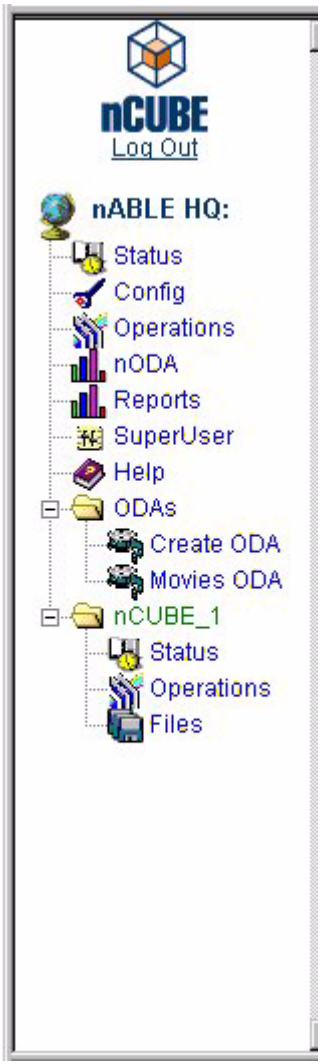
- Navigation Tree
- Main Window
- Detail Window

NAVIGATION TREE

The Navigation Tree provides the entry point to the major VOD system management areas, including:

- **Status:** High-level, real-time reports of system health
- **Config:** Network resource configuration and management, and nABLE user permission management
- **Operations:** Detailed, real-time information for all VOD system operations
- **Reports:** Detailed, real-time reports for video stream session usage
- **SuperUser:** Low-level, diagnostic functions
- **Help:** Online User Manual
- **ODA:** Configuration and management of On-Demand Applications (ODAs) including all ODA metadata
- **Headends/POPs:** Location-specific administration for each Headend / Point of Presence (POP) in the system

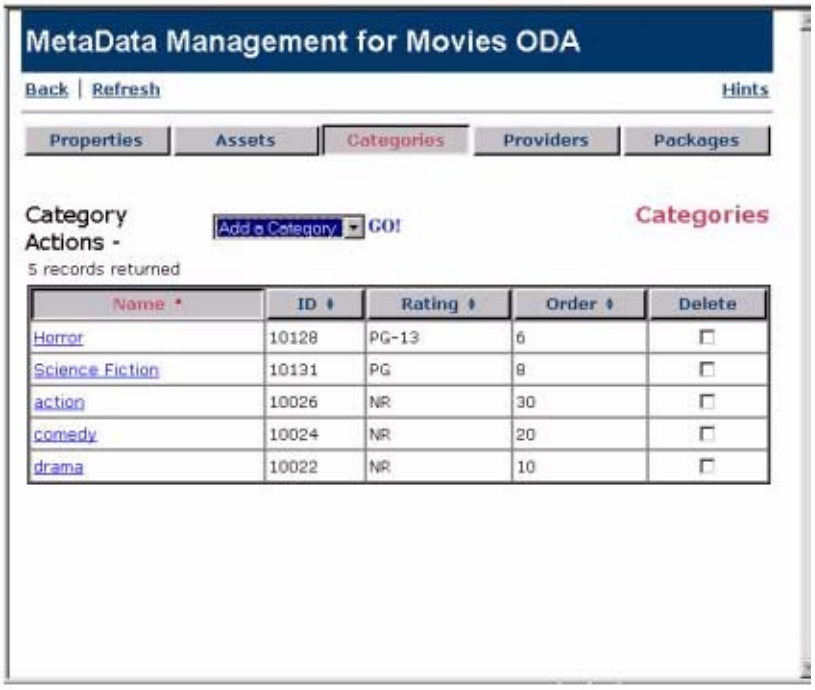
The Navigation Tree provides a persistent view of the core functional areas in the VOD system.



When operators select an Object, the details for the Object are displayed in the Main Window.

MAIN WINDOW

The nABLE Work Window, is where users view system information and perform system functions.



The following table describes the interface components of nABLE:

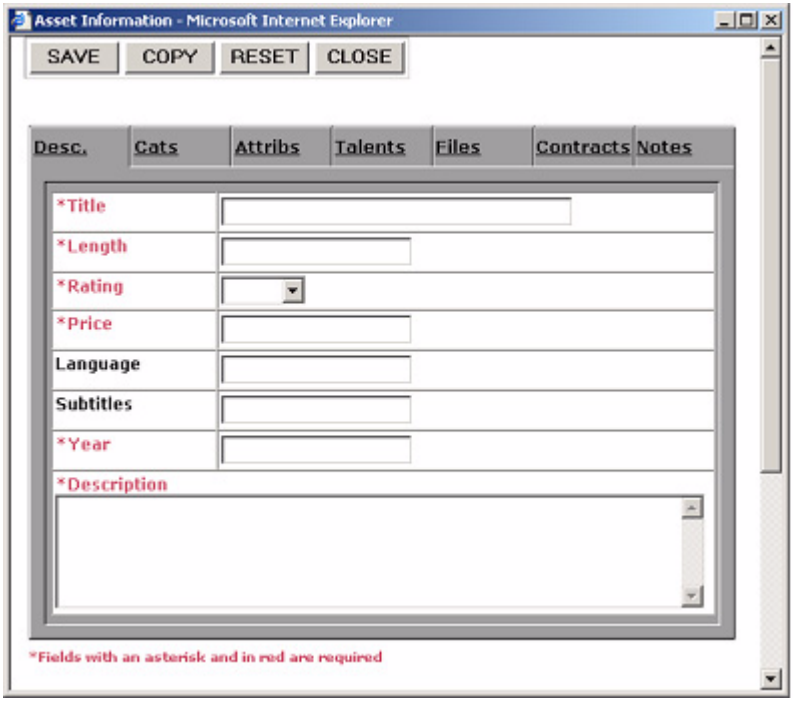
Component	Description
Window Label	Indicates the current section of nABLE.
Global Navigation	Global navigation is available throughout nABLE.
Workflow Selectors	Workflow selectors allows users to switch between related tasks within functional areas.
Workflow Actions	The workflow actions drop-down menu lists the available actions for the selected workflow area.

Information Table	Information tables display information for the current workflow area.

DETAIL WINDOW

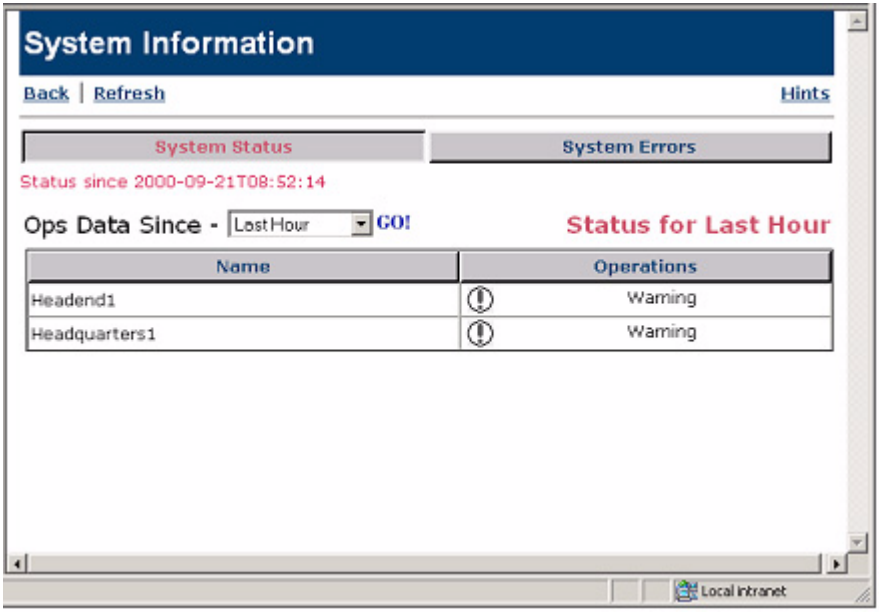
Detail windows report specific nABLE database information to users. For example, when you create a new asset for an ODA, you enter the details for the new asset in an Asset Detail window, and then select SAVE to commit the asset to the database. Similarly, when you view the details for a specific system error, you use the Error Detail window.

Detail windows often include one or more tabs and each tab contains related information fields. You can switch between tabs by selecting the tab you want to view.



Status

The Status function provides operators with a high-level view of the system's operations. Through the interface, operators can enter historical and realtime queries about VOD operations for the Headquarters and each Headend or POP in the system. If the status query returns an error report, the operator can select the error to view Operations Details for the error. nABLE then routes the operator to the Operations section and displays the Operations Details panel.

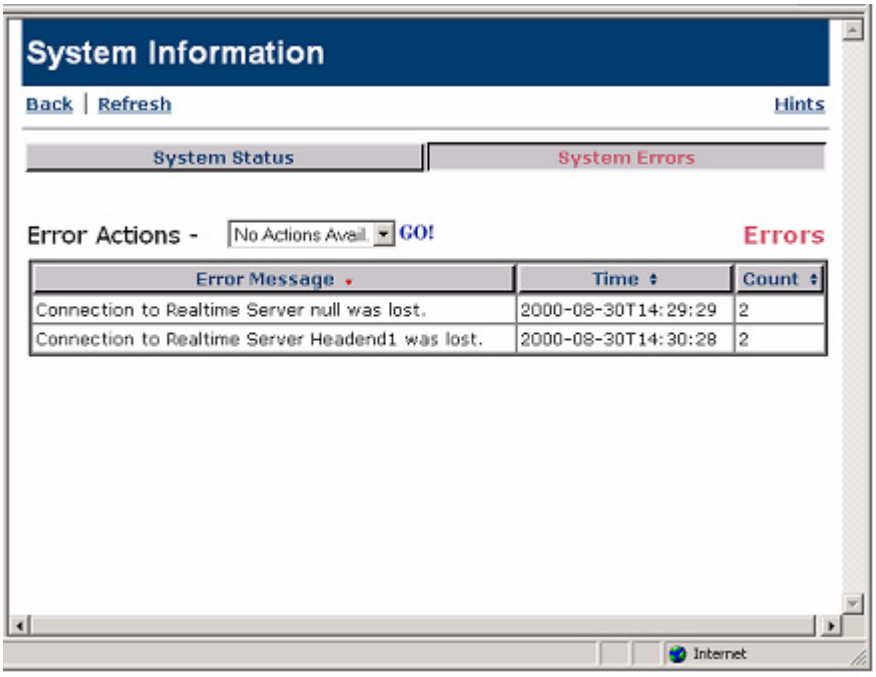


System Errors

Operators have access to the nABLE System Error Log through the Status interface. The System Errors panel extracts error information from the System Log.

The System Information Error screen:

- Explains errors in plain English
- Reports time of last occurrence of the error
- Counts number of occurrences of the error

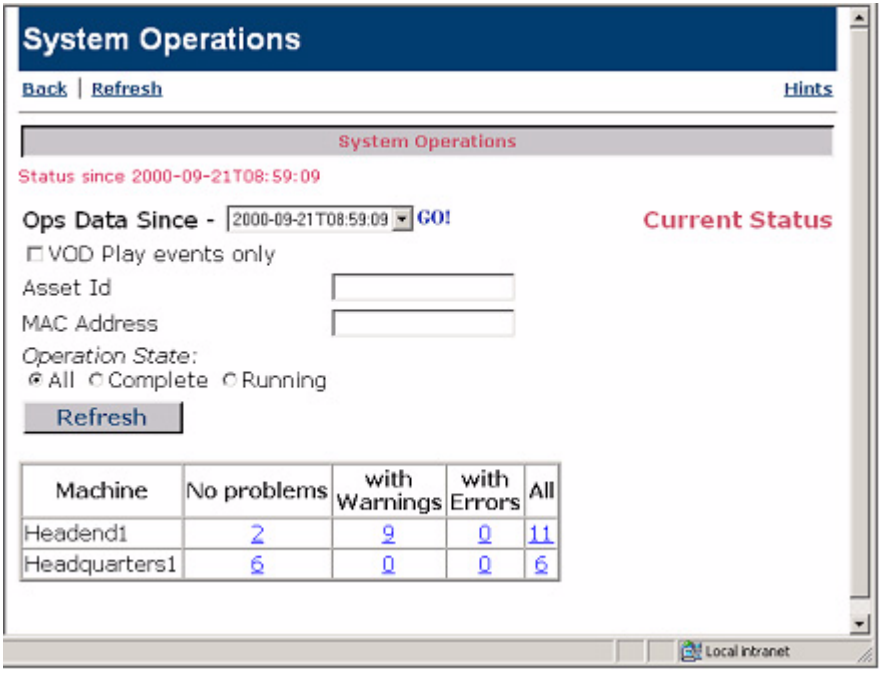


Operations

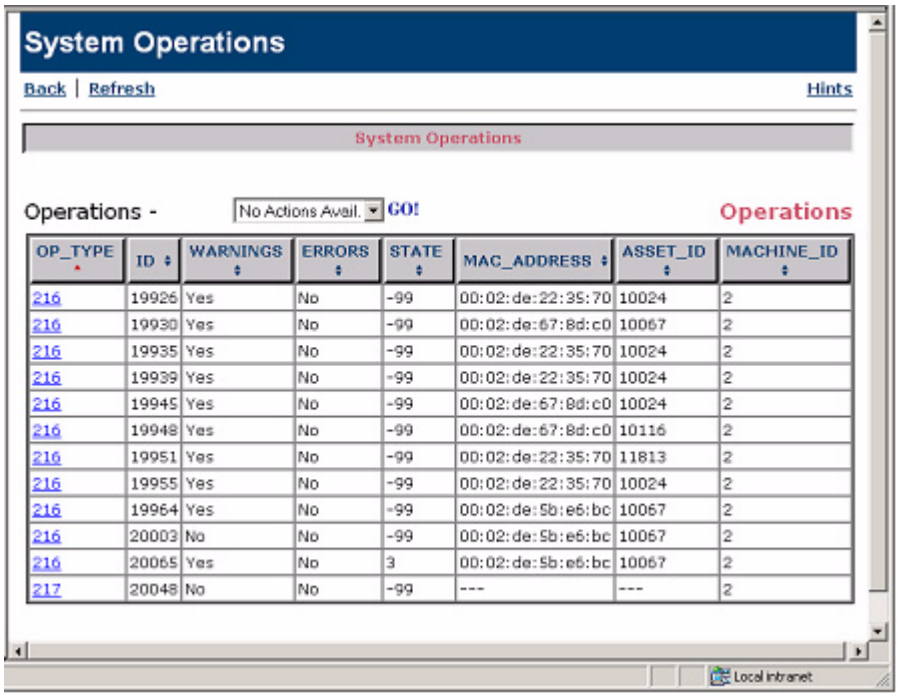
The Operations function of nABLE gives operators access to detailed operations data for all VOD processes. Operators can query operations by specific set-top box (MAC Address) or by a specific customer order (Asset ID), or they can query operations within a specific historical time frame.

In response to the operator query, nABLE builds a table with the Operations data and these status indications:

- No problems — The operation has proceeded without any problems to report.
- Warnings — nABLE has issued a warning for the error. Operations with warning are allowed to continue.
- Errors — nABLE has issued an error for the operation. Operations with errors are cancelled.



Operators can view specific information for a warning or error by selecting the warning or error to view the Operations Details.



OP_TYPE	ID	WARNINGS	ERRORS	STATE	MAC_ADDRESS	ASSET_ID	MACHINE_ID
216	19926	Yes	No	-99	00:02:de:22:35:70	10024	2
216	19930	Yes	No	-99	00:02:de:67:8d:c0	10067	2
216	19935	Yes	No	-99	00:02:de:22:35:70	10024	2
216	19939	Yes	No	-99	00:02:de:22:35:70	10024	2
216	19945	Yes	No	-99	00:02:de:67:8d:c0	10024	2
216	19948	Yes	No	-99	00:02:de:67:8d:c0	10116	2
216	19951	Yes	No	-99	00:02:de:22:35:70	11813	2
216	19955	Yes	No	-99	00:02:de:22:35:70	10024	2
216	19964	Yes	No	-99	00:02:de:5b:e6:bc	10067	2
216	20003	No	No	-99	00:02:de:5b:e6:bc	10067	2
216	20065	Yes	No	3	00:02:de:5b:e6:bc	10067	2
217	20048	No	No	-99	---	---	2

Network Configuration and Management

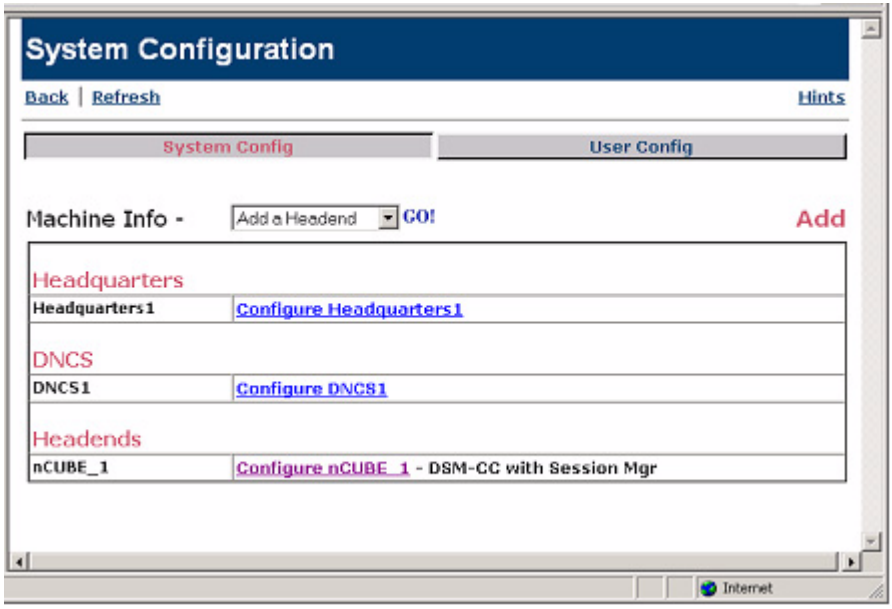
nABLE's System Configuration gives operators a facility for end-to-end network configuration and management. This facility provides operators with a single point of access to the network that enables operators to:

- Add and configure Headends or POPs to the system
- Configure network resources from the video server to the service group (node or edge of network)
- Register network resources with nABLE's Dynamic Channel Allocation (DCA) server process
- Add and configure video server resources into the system
- Design bandwidth parameters and load-balancing for all network resources
- Add and configure system users and permissions

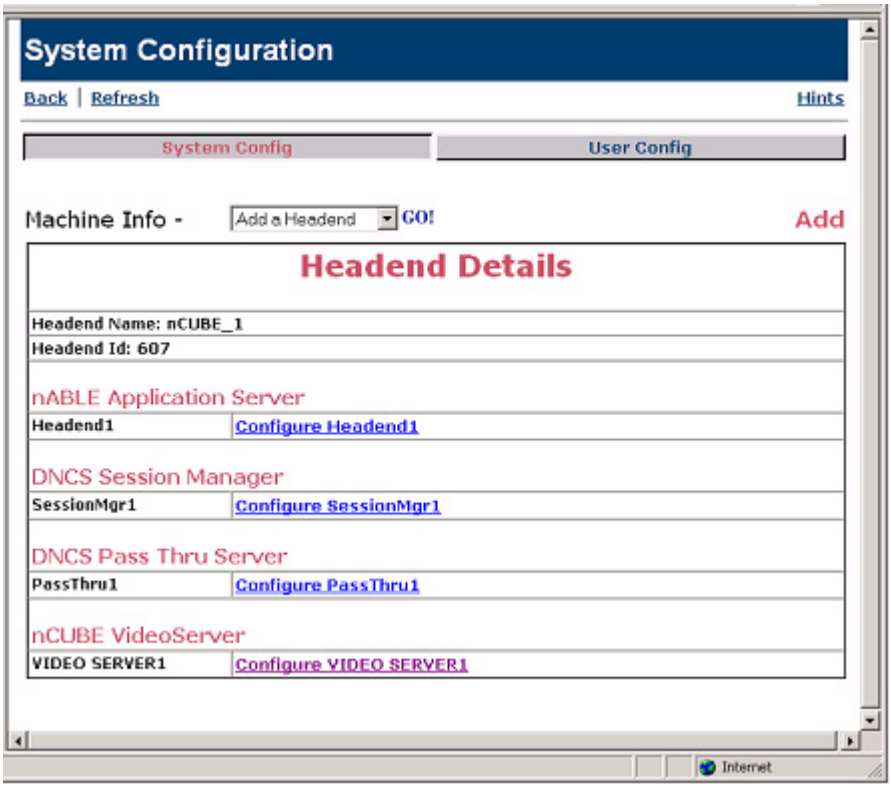
For example, an operator or an administrator may need to allocate additional bandwidth to a particular service group because of a recent increase in demand for streams from a particular service group. In most deployments, nABLE DCA automatically load-balances and provisions bandwidth for all sessions; however, nABLE gives administrators the ability to reallocate video server resources as necessary.

The following example illustrates this procedure.

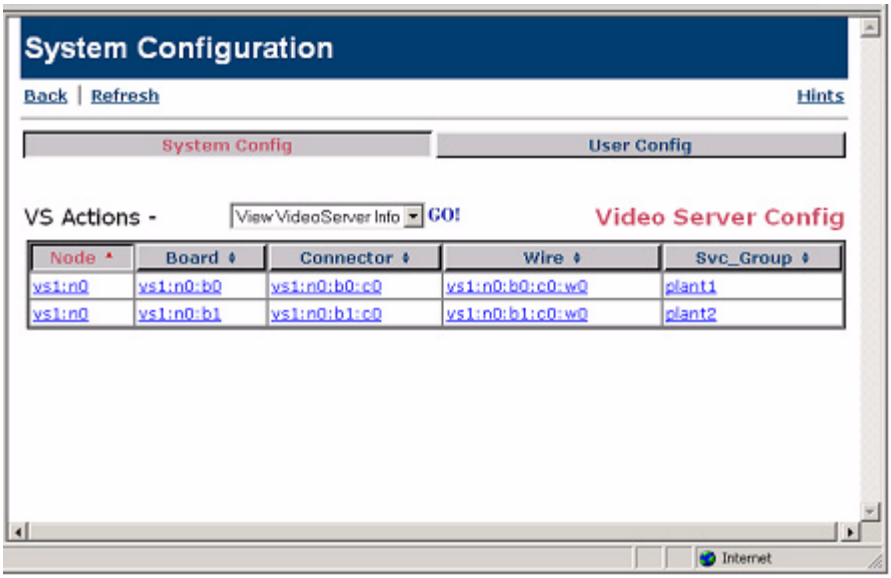
The system administrator selects the **Config** button to open the System Configuration section and then selects the headend / POP for the service group (nCUBE_1).



Next, the operator views information for the video server at the headend / POP (VIDEO SERVER1).

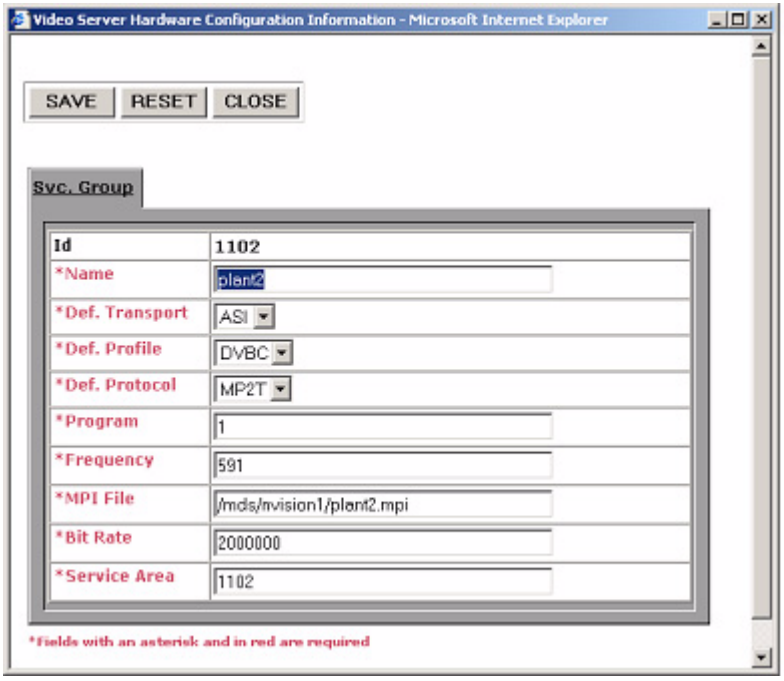


The operator then views the network resources associated with the video server at the headend / POP.



The operator reassigns Video Server node0 to plant1, which is experiencing the increased bandwidth demand.

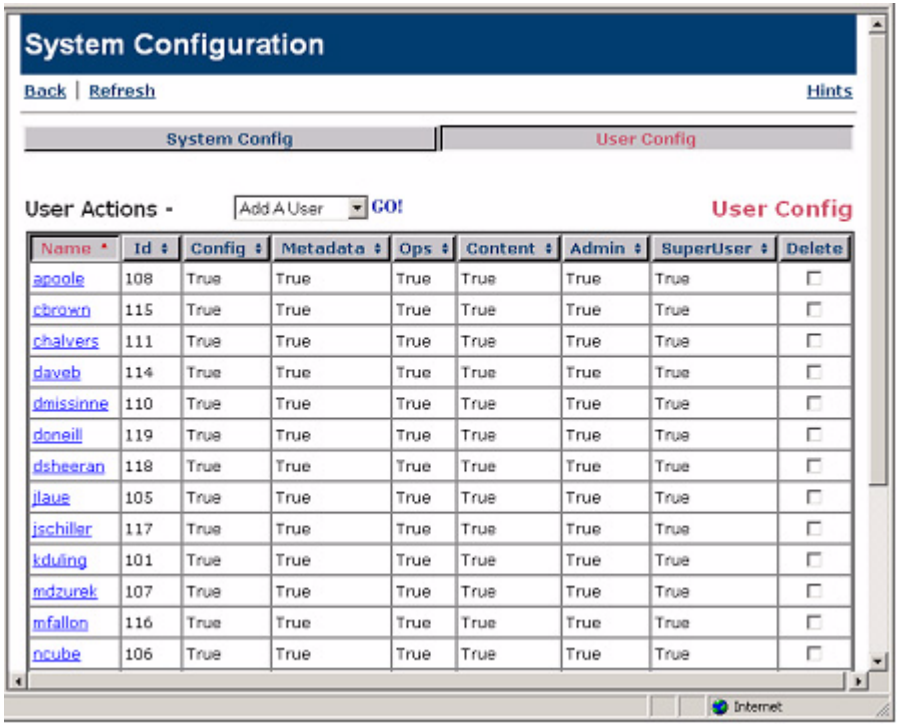
Selecting Service Group plant2 in the table, the administrator changes the group to Group 1.



User Administration

nABLE uses a discrete permissions system in which user system capabilities are directly related to system permissions. Users see only those Navigation options for which they have permission.

For example, an operator who is not given system configuration privileges does not see the Config button on the Navigation panel. An operator who is given full permissions sees all system functionality areas.



nABLE provides the following Permissions Levels and associated privileges:

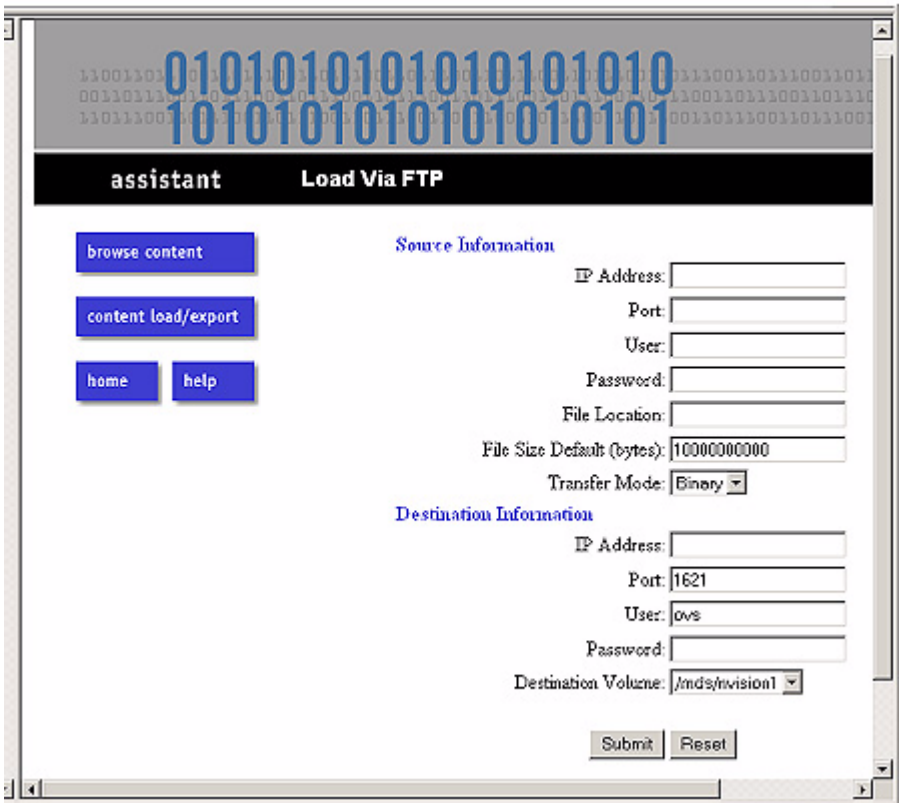
Permission	Granted Privileges
Super User	Perform advanced system administration and view system diagnostics.
Config	Perform system configuration, including adding and deleting system resources.
MetaData	Configure and manage metadata.
Operations	View operations data for the system.
Content	Browse, load, delete and register content data files.
Admin	Add and delete users, and assign user rights.

Content Management

nABLE's Content Loading Facility provides an easy-to-use, centralized facility to manage content files throughout the VOD system. Operators use nABLE to load and register content on n4 video servers, and to propagate content to n4s throughout a distributed VOD deployment.

Loading Content

Each headend or POP in the VOD network has its own discrete folder in the nABLE Navigation Tree. The Files option for each headend provides operators with the facility for managing video files on the n4 video server at the headend or POP. nABLE supports load processing from mass media (DAT or DLT) and over the network via FTP.



When loading files within nABLE, operators define the source and destination directories for the content, submit the request, and nABLE performs the load processing.

Note: Content files also can be batch loaded onto the video server from mass storage (DAT or DLT) using **tar**.

Registering Content

Once content has been loaded onto the n4 video server, the operator registers the content with the Oracle database.

The file registration process:

- Generates the tag file for each video file
- Creates database entries for the video file and tag file

The tag file catalogs frame data that makes VCR functionality possible, such as fast forward and rewind, playing video at different speeds, searching, and pausing and playing.

Note: If you are acquiring your content from an encoding firm, be sure to specify your requirements.

- Block size: Larger blocks are faster to read and write
- Tape Labels: Information such as block size is convenient
- Filenames: Length and character limitations; for example, MDS filenames cannot have spaces

Metadata Management

Household subscribers typically access and purchase VOD services through an On-Demand Application (ODA). The ODA client application resides on the household set-top box and communicates interactive session setup and stream control requests with the VOD system. Importantly, the ODA receives information about VOD content offerings from the VOD system in the form of *metadata*.

One of nABLE's key functionalities is its facility for creating, maintaining, and publishing ODA metadata to ODA client applications.

The core functions of ODA metadata are:

- Defining the asset and package offerings displayed on the subscriber's set-top box
- Assigning audience ratings to assets
- Supplying deployment-specific business logic, such as pricing and availability

Asset metadata is fully configurable in nABLE to support the unique service and process requirements of operators. nABLE allows operators to define asset metadata including:

- Asset Description
- Asset Categories
- Asset Attributes
- Asset Providers
- Asset Packages

On-Demand Applications

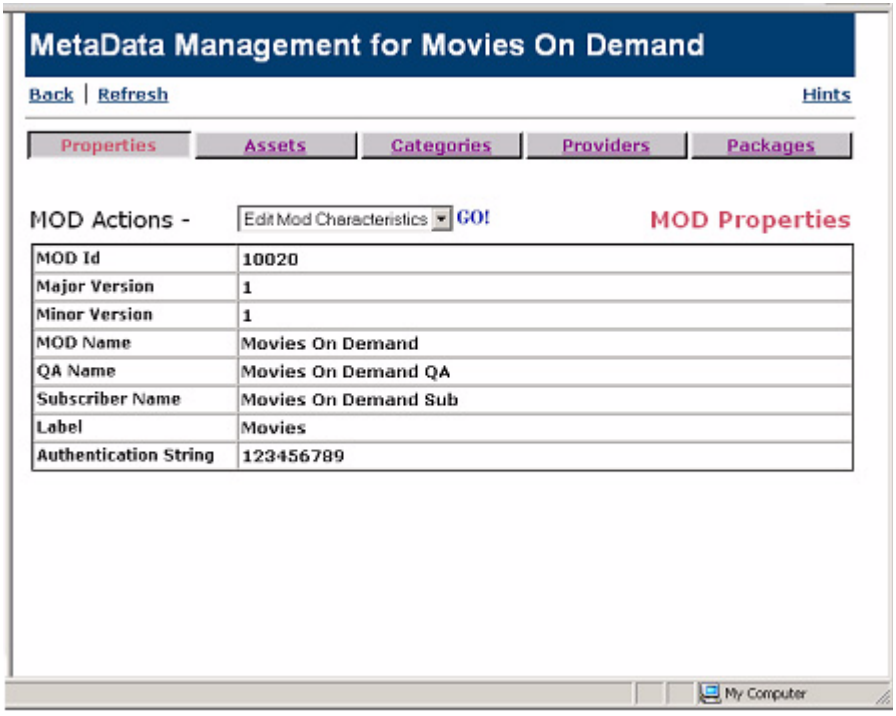
nABLE supports multiple On-Demand Applications (ODA), giving operators the ability to define specific asset collections for different media categories. For example, the operator could group all of the system's movies in one application, video games in a second application, and movie trailers in a third.

Once an ODA has been created, the operator can manage the related ODA metadata across five workflow areas:

- **Properties**: Edit and delete the module's characteristics and export the applications to the test and production environments.
- **Assets**: Add, delete and configure the assets in the collection.
- **Categories**: Define the asset categories that are published to the ODA subscriber interface.
- **Providers**: Define the content providers and related contractual business information.
- **Packages**: Add, delete and configure asset packages.

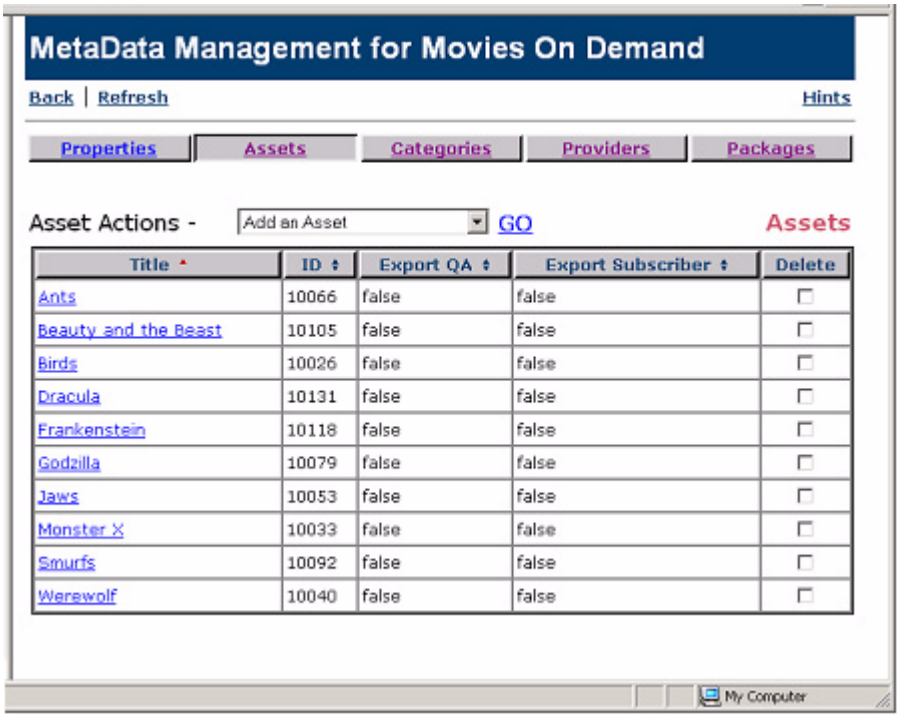
Properties

The Properties workflow area allows the operator to edit and delete the existing information relating to the ODA, import assets into the ODA and export ODA updates to the test (QA) or production (Subscriber) environments.



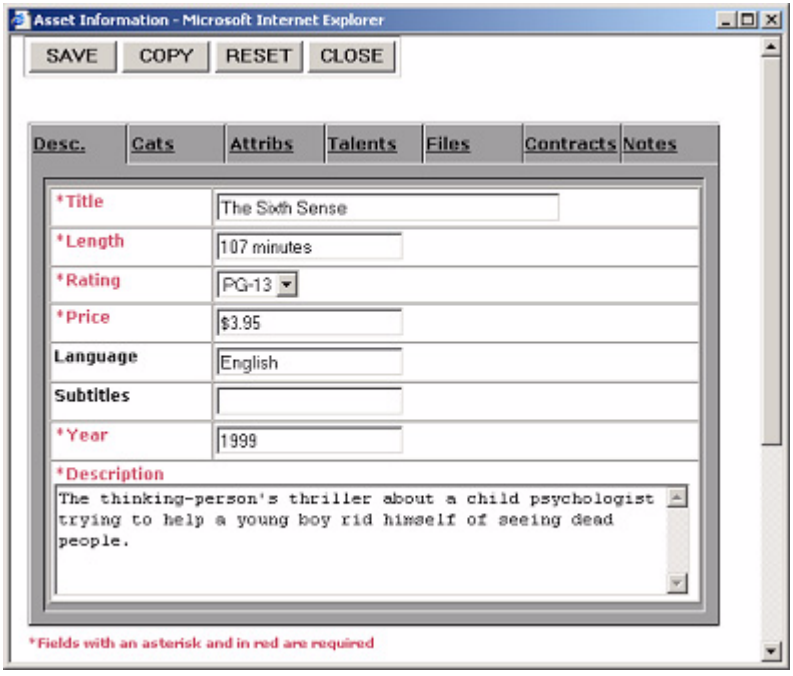
Assets

The assets workflow area allows the operator to define add, delete, and configure the assets in each ODA. Metadata display in the GUI is configurable, allowing nABLE operators to configure the GUI to the specific and unique requirements of their asset and package implementations.



ASSET DESCRIPTION

The Asset Description tab allows the operator to define the asset information that is published to the set-top box application and viewed by the subscriber.



The configurable fields for Asset Description are:

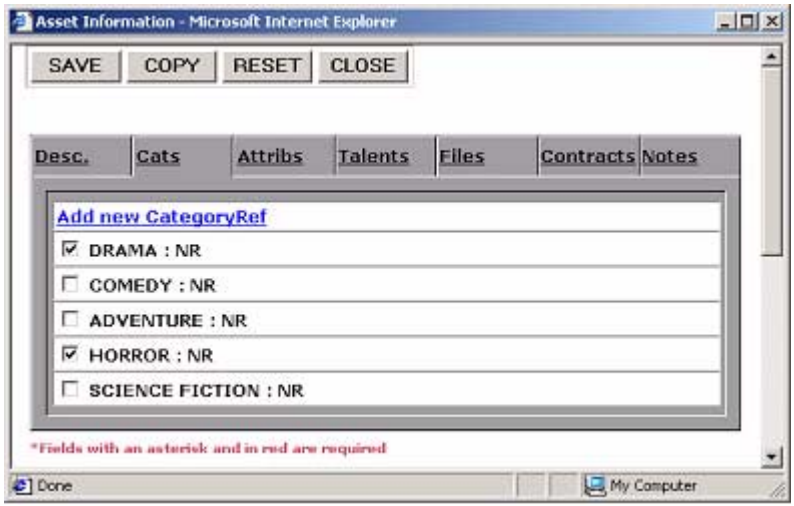
Field	Requested Information
Title	The title of the asset.
Length	The running time of the video, expressed in minutes.
Rating	The audience rating for the video. Select from the pull-down menu.
Price	Price required to view the video from the VOD service.
Language	Original language of the video.
Subtitles	Language of subtitles, if any.

Year	The release year of the film.
Description	A short description of the video's plot and other noteworthy items about the asset.

ASSET CATEGORIES

The Asset Categories tab allows operators to define the categories in which the video will appear on the set-top box.

For example, the operator may want the video *The Sixth Sense* to be available in the Drama and Horror Categories. Users browsing the catalog would then have the opportunity to select *The Sixth Sense* while browsing either of these categories.



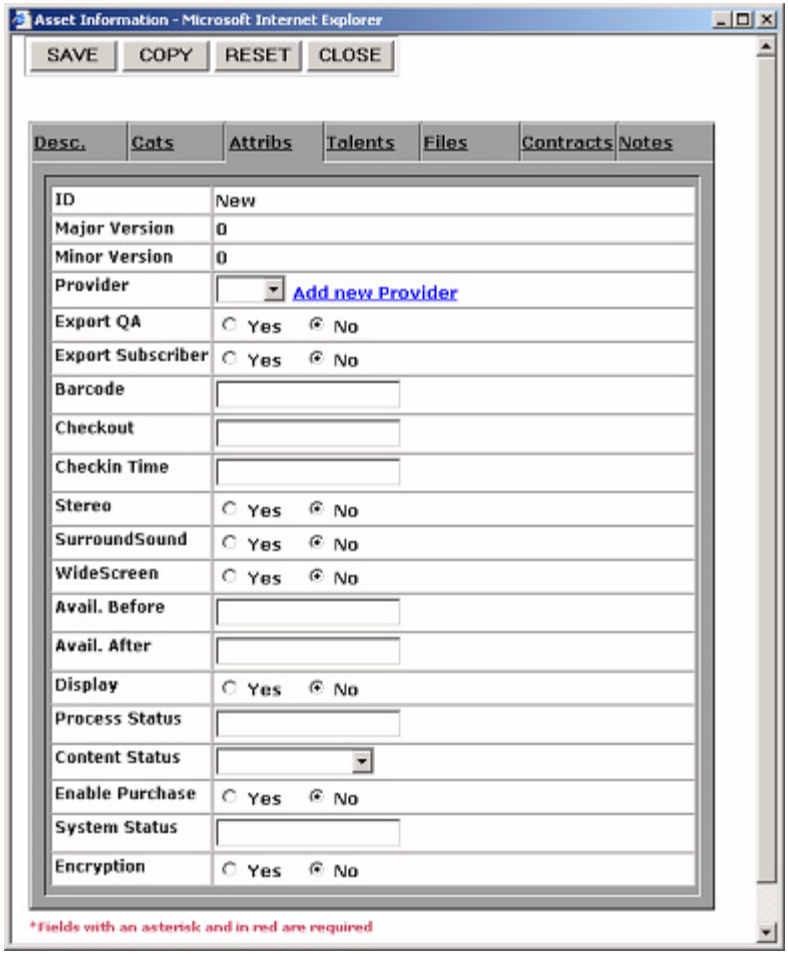
ASSET ATTRIBUTES

The Asset Attributes tab includes asset-related system information such as availability and display information. From the Asset Attributes tab, the operator can:

- Assign the video file for the asset

- Export the asset to the QA and / or Subscriber environment
- Define the availability of the asset
- Specify if encryption should be enabled

The information on this tab is not viewable by the customer.



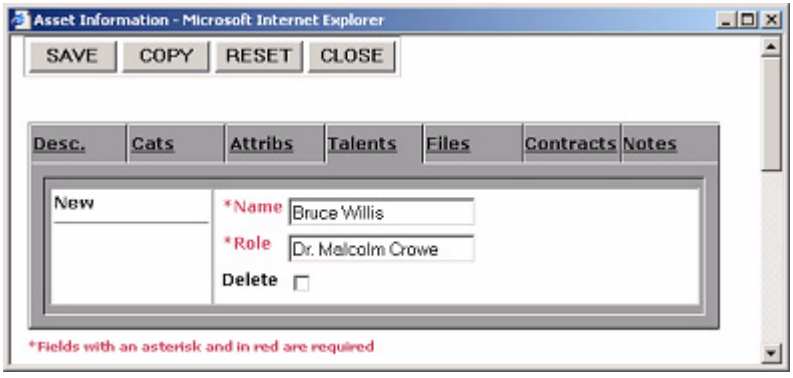
The following table describes the fields in the Attributes tab:

Field	Requested Information
ID	A unique number generated by nABLE for the asset. The number is stored in the database and is not editable.
Major Version	The current major version number for the asset. Each time you save a change to the configuration of the asset, the major version increases by 1.
Minor Version	The current minor version number for the asset.
Provider	The content provider that licenses the asset's video file
Export QA	Determines if the video is to be exported to the test VOD environment during the next export. Yes or No
Export Subscriber	Determines if the video is to be exported to the production VOD environment during the next export. Yes or No
Barcode	The barcode number of the asset.
Checkout	The total checkout time customers receive with the purchase of the asset. For example, subscribers could have a 72-hour checkout window in which to watch the movie.
Checkin Time	The time when the asset must be checked in. (An asset may be available from the time of purchase until midnight the following day.)
Stereo	The asset has or does not have stereo sound track. Yes or No
Surround Sound	The asset has or does not have surround sound. Yes or No
Wide Screen	The asset uses a wide-screen format. Yes or No
Avail. Before	If applicable, enter the time before which the asset is available. For example, children's assets may be available before 10:00.
Avail. After	If applicable, enter the time after which the asset is available. For example, adult content may be available after 21:00.

Display	The asset is ready to display to the ODA client application and the subscriber.
Process Status	MSOs can use this area to support unique internal processes. Labels entered in this space could be extracted from the database with use of a script and the resulting information formatted for the site's reporting needs.
Content Status	The current load status of the asset. Choose from not_loaded, partially_loaded or complete.
Enable Purchase	Indicates if the asset can be purchased by the subscriber. In some instances, assets may be published to the subscriber, but the subscriber is not yet able to purchase the asset.
System Status	The status of the asset and all of the asset's related files. Operators may use this field to note process completion for an asset.
Encryption	The asset is encrypted. Yes or No

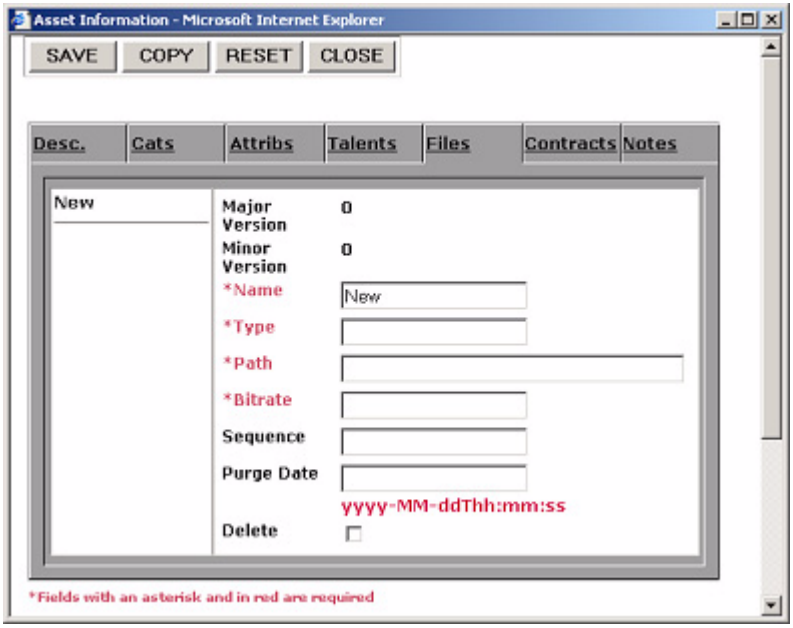
ASSET TALENTS

The Asset Talents tab allows the operator to identify noteworthy actors and their roles in the film. In the future, customers may be able to search the nABLE database for films based on an actor's name.



ASSET FILES

The Asset Files tab defines the asset's associated media files, including the location of the video server.



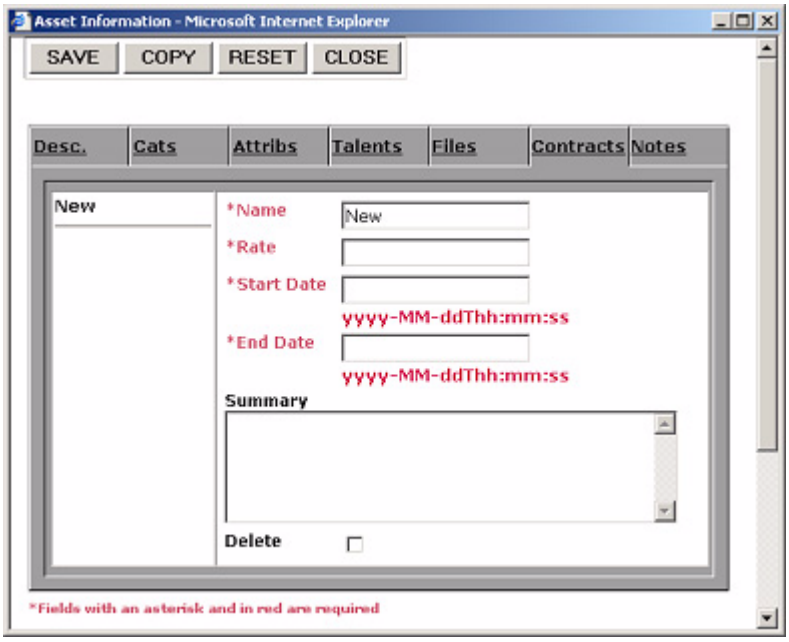
The following table describes the fields in the Asset Files tab:

Field	Requested Information
Major Version	The current major version number for the asset. Each time you save a change to the configuration file of the asset, the major version increases by 1.
Minor Version	The current minor version number for the asset.
Name	The name of the file.
Type	The file type. For example, MPEG-2.
Path	The directory path on the n4 for the file or files.
Bitrate	The encoding bitrate for the video in bits per second. For example a file encoded at 6 Mb/s would be 6,000,000.

Sequence	The sequential order in which the asset files are played.
Purge Date	The date the asset must be removed from the collection.

ASSET CONTRACTS

The Asset Contracts tab lets operators enter information about contracts and business rules affecting the asset.



The following table describes the fields in the Asset Catalogs tab:

Field	Requested Information
Name	The name of the contract.
Rate	The content provider licensing percentage or split for the asset.
Start Date	The date the contract takes effect.

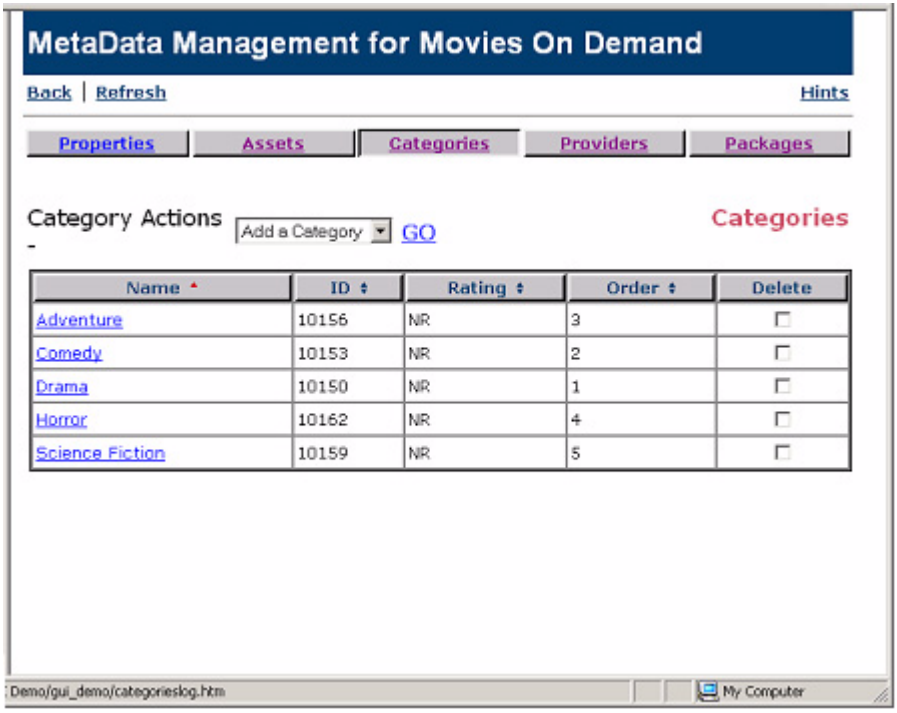
End Date	The date the contract is no longer effective.
Summary	A summary description of the contract terms.

Categories

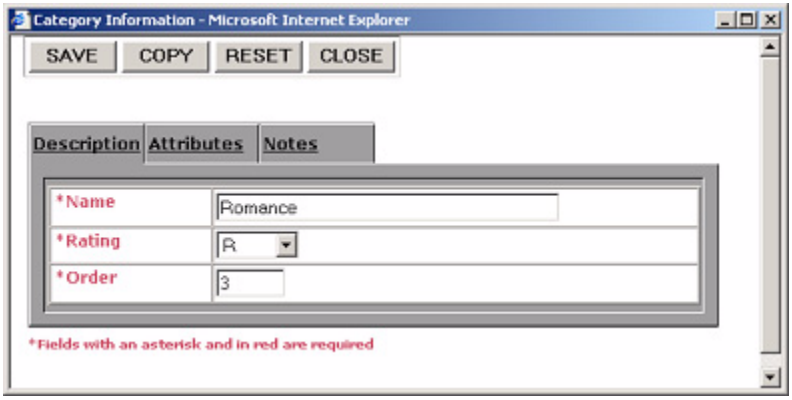
nABLE allows the operator to add categories, delete categories, and redefine categories.

In addition to category customization, nABLE allows the operator to assign audience ratings to categories. These ratings designations may be used to limit the availability of content in conjunction with the subscriber's set-top box parental controls.

For example, if the adventure category was assigned an "R" rating and the customer's Electronic Programming Guide (EPG) was set to block movies with an R rating, then the adventure category would not appear on the set-top box's interface.



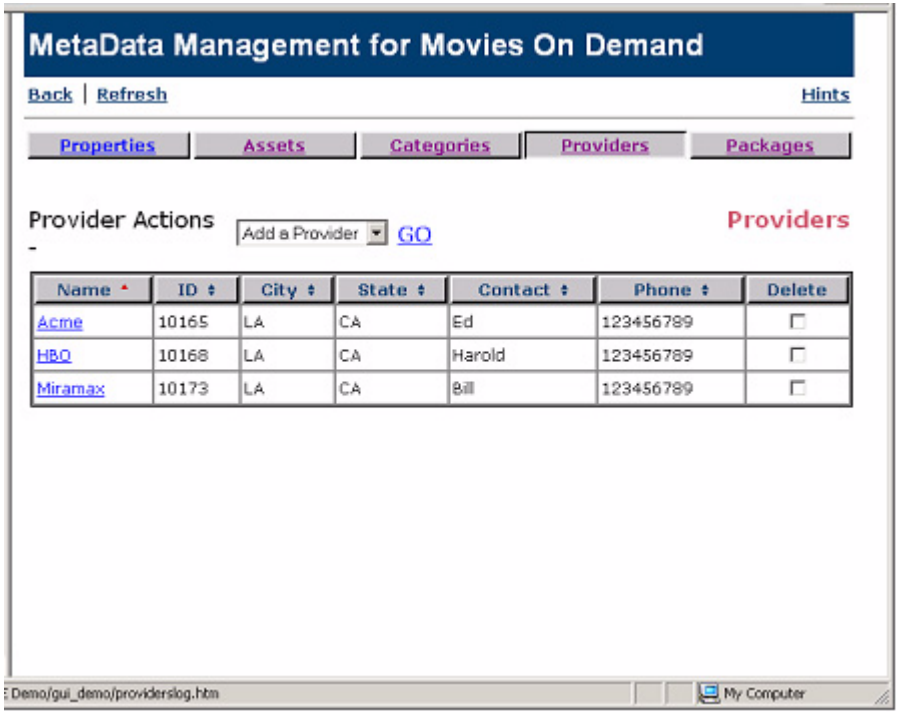
When operators add a category, they provide a name, rating and order number.



The name becomes the category's designation, such as Adventure, and the rating is the movie or television rating given by the content provider, such as PG-13 or TVMA. When no rating is provided, the operator can enter NR, for Not Rated. The order number sets the position in which this category is seen by subscribers as they browse through their choices. Some set-top box applications can only show three categories per screen and operators may find it customer-friendly to place the more popular categories early in the rotation.

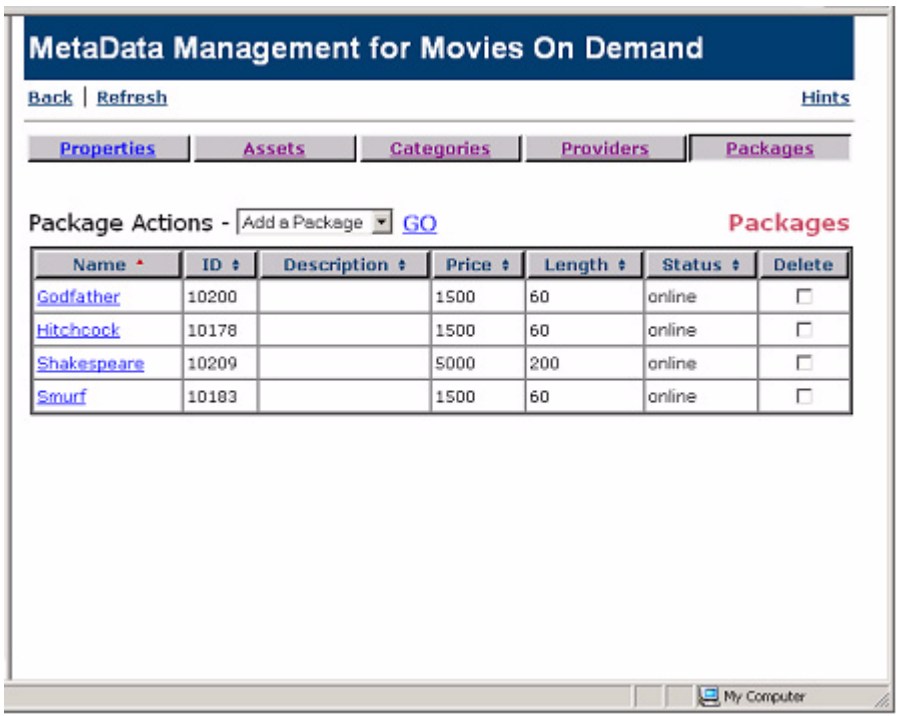
Providers

The Providers panel helps operators define the content providers and related contractual business information. By clicking on the name of a provider, the operator can view the company's address and main contact name, as well as a Notes tab that can display helpful hints relating to the specific provider.



Packages

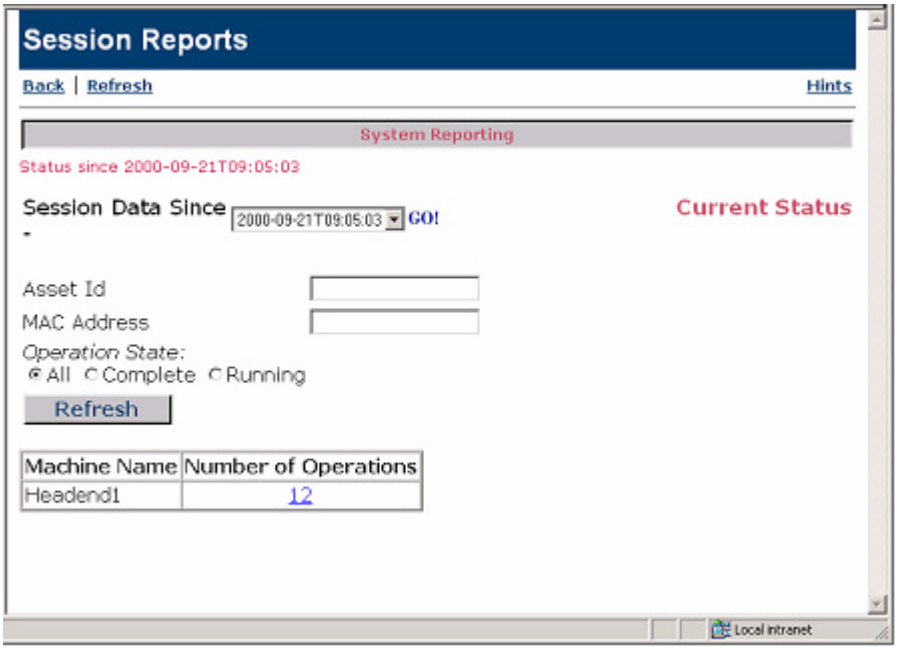
Operators use the Packages panel to group together videos under a common heading. They may decide to offer a Michelle Pfeiffer package that is composed of “What Lies Beneath,” “Up Close and Personal,” “Dangerous Minds,” “Tequila Sunrise,” and “Ladyhawke.” They also could offer a package of Dracula films that includes the 1931 version made famous by Bela Lugosi, the 1979 version starring Sir Laurence Olivier, and the more recent movie starring Winona Ryder and Keanu Reeves. Subscribers can purchase the package of films and watch any of the movies during their allotted time window.



Reports

The Reports section of nABLE displays information related specifically related to subscriber usage of the VOD service. Operators use Reports data to better understand how their customers are using VOD. Using this customer information, operators can:

- Refine content offerings based on customer demand
- Identify marketing opportunities
- Re-allocate network bandwidth to meet demand-intensive nodes



The following table explains the information provided through the nABLE Reports:

Field	Description
Start Time	The time the session started.

End Time	The time the session completed.
Last Update	The last time any activity occurred for the session.
Asset ID	The unique identifier assigned to the asset by nABLE.
Price	The cost of the asset to the subscriber.
Plays	The number of times Play was selected during the session.
Rewinds	The number of times Rewind was selected during the session.
Forwards	The number of times Fast Forward was selected during the session.
Pauses	The number of times Pause was selected during the session.
Current State	The current status of the session: Complete or Running
NPT	Normal Play Time. The value in this column represents the number of seconds into the movie before Pause was selected.
MAC Address	The unique address of the set-top box.

Summary

nABLE is an intuitive, user-friendly VOD system management application. nABLE gives providers operational advantages including centralized system management, automated asset management and reduced personnel costs. The user interface ensures that operators can quickly and efficiently monitor system operations, configure network bandwidth and manage revenue-generating video-on-demand content.