Dialogic®

Dialogic® Native Configuration Manager API

Programming Guide

May 2008

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Revision History

This revision history summarizes the changes made in each published version of this document.

Document No.	Publication Date	Description of Revisions
05-1904-006	May 2008	Made global changes to reflect Dialogic brand and changed title to "Dialogic® Native Configuration Manager API Programming Guide." Section 1.1, "Features", on page 9: Added Third Party Devices feature.
05-1904-005	August 2006	Application Development Guidelines chapter: Added new Section 5.8, "Discovering Installed Devices", on page 25."
05-1904-004	October 2005	Global change: Added information about Dialogic® Host Media Processing (HMP) Software release. Bridge Devices chapter: Added this chapter for Dialogic® Host Media Processing (HMP) Interface Board support.
05-1904-003	April 2005	Features section: Removed information about support for third party devices.
05-1904-002	November 2003	Features section: Reclassified the NCM API features. Restrictions and Limitations section: Added note recommending that users not parse the device name. Added note that detection is always run automatically via the Plug and Play Observer service that is set to run automatically on system start. NCM API Architecturefigure: Replaced with redrawn version. Programming Models chapter: Added paragraph about exceptions to the synchronous mode of operation. Event Handling chapter: Added paragraph about the NCM AUID functions. Configuration Parameter Property Groups section: Added mention of two more groups (Misc and TDM Bus Configuration). Device Model Names and Unique Device Names section: Added NCM_ApplyTrunkConfig and NCM_ReconfigBoard to the list. Added information about the automatic creation of device names.
05-1904-001	November 2002	Initial version of document. Much of the information in this document was previously published in the *Customization Tools for Installation and Configuration for Windows®*, document number 05-1103-007.

About This Publication

The following topics provide information about this *Dialogic® Native Configuration Manager API Programming Guide*:

Purpose

This publication provides guidelines for building customized system management applications for Dialogic® Host Media Processing (HMP) Software and Dialogic® System Release Software using the Dialogic® Native Configuration Manager (NCM) API on Windows® operating systems. Such applications include, but are not limited to, TDM bus clock fallback management, device configuration, and single board stop/start programs.

This publication is a companion guide to the *Dialogic® Native Configuration Manager API Library Reference*, which provides details on the functions and parameters in the Dialogic® NCM API library.

Applicability

This document version (05-1904-006) is published for Dialogic® Host Media Processing Software Release 3.0WIN.

This document may also be applicable to other software releases (including service updates) on Windows® operating systems. Check the Release Guide for your software release to determine whether this document is supported.

Intended Audience

This information is intended for:

- Distributors
- System Integrators
- Toolkit Developers
- Independent Software Vendors (ISVs)

- Value Added Resellers (VARs)
- Original Equipment Manufacturers (OEMs)

How to Use This Publication

This document assumes that you are familiar with and have prior experience with Windows® operating systems and the C programming language. Use this document in tandem with the *Dialogic® Native Configuration Manager API Library Reference*.

This publication is organized as follows:

- Chapter 1, "Product Description" introduces the features of the Dialogic NCM API library and provides a brief description of each feature.
- Chapter 2, "Programming Models" provides a brief overview of supported programming models.
- Chapter 3, "Event Handling" provides information about handling events that are generated by certain NCM library functions.
- Chapter 4, "Error Handling" includes information about handling errors within your application.
- Chapter 5, "Application Development Guidelines" provides programming guidelines and techniques for developing an application using the Dialogic NCM API library.
- Chapter 6, "Clock Master Fallback List" includes guidelines for using the Dialogic NCM API library to set a customized CT Bus clock master fallback list.
- Chapter 7, "Bridge Devices" provides information about using the Dialogic NCM API library to programmatically control bridge devices. Dialogic® Digital Network Interface boards have a bridge device that enables communication and media streaming between Dialogic® HMP Software and the boards on the CT Bus.
- Chapter 8, "Building Applications" discusses compiling and linking requirements such as include and library files.

Related Information

See the following for additional information:

- *http://www.dialogic.com/manuals/* (for Dialogic® product documentation)
- *http://www.dialogic.com/support/* (for Dialogic technical support)
- *http://www.dialogic.com/* (for Dialogic® product information)

Product Description 1

This chapter provides a general description of the Dialogic® Native Configuration Manager (NCM) library. Topics include:

1.1 Features

The Dialogic® NCM API consists of a library of functions for creating and manipulating the configuration data necessary to initialize Dialogic® devices and control their operation on Windows® systems. The features available through the Dialogic NCM API library can be grouped as follows:

- **Configuration: get and set parameters**
  - **Board/Bus** - determine which devices can be installed and which configuration parameter values can be set for a given Dialogic® Software release; set configuration parameter values for the boards or bridge devices in your system.
  - **Clock Master Fallback list** - Get/set the TDM bus clock master fallback list for your system. The clock master fallback list defines master capable devices in a preferred order. If the primary clock master should fail, this list is consulted by the system and a new primary clock master is assigned.
  - **Bridge Device Clock Master Fallback list [for Dialogic® Host Media Processing (HMP) Software only]** - Dialogic® HMP Interface Boards have a bridge device that enables communication and media streaming between Dialogic® HMP Software and the boards on the CT bus. The Dialogic NCM API allows you to programmatically define a bridge device clock master fallback list. This list is used to specify which bridge device provides streaming synchronization to the Dialogic® HMP Interface Boards in the system.

    Note: The bridge device clock master fallback list has no relation to the clock master fallback list, which is used to select clock masters to drive the CT bus.
  - **Third Party Devices (not supported by Dialogic® HMP Software)**
    - **Add/remove board** - Add a third party device to the system or remove a third party device from the system. You may also define the TDM bus capabilities of the third party device that you add to the system.
    - **Allocate/deallocate timeslots** - Allocate/deallocate TDM bus time slots for use by third party devices. Dialogic® boards will not use time slots that have been allocated to third party devices.
- **Initialization/Uninitialization**
  - **Start/stop system** - Start/stop the Dialogic® System Service and check the system status.

  - **Stop/start board** - Stop and start individual boards in the system without affecting system operation. Refer to the System Administration Guide that accompanied your system software release for complete information about stopping and starting Dialogic® boards.
  - **Start/stop bridge devices** - Stop and start individual bridge devices in the Dialogic® HMP Software system without affecting system operation. Refer to the System Administration Guide that accompanied your system software release for complete information about stopping and starting Dialogic Digital Network Interface boards.
  - **System startup mode** - You can set the startup mode to automatic or manual.
- **Miscellaneous**
  - **Get AUID** - Get the device name for a given AUID and/or get the AUID for a given device name. An AUID is a unique string of numbers that the Dialogic® System Software assigns to any system component with which communications can be initiated. In the context of the Dialogic NCM API, each unique device that is instantiated in the system is assigned an AUID.
  - **Country specific format** - Obtain information about country-specific parameters such as a list of supported countries, a country code or name for a given country, and values for country-specific configuration parameters. This only applies to Dialogic® Springware devices.
  - **Release and operating system information** - Determine which operating system and Dialogic System Software versions are installed on the host computer.

1.2 Restrictions and Limitations

The following restrictions and limitations apply to the Dialogic NCM API:

- You can add and modify configuration data only for those hardware products supported by the software release of which the Dialogic NCM API is a component. Refer to the *Release Guide* that accompanies each system software release for a list of supported products.
- Because devices are instantiated in the system configuration according to their unique device name, it is impossible to correlate an instantiated device with a device model name. You should embed the device model name within the unique device name when you instantiate the device with the **NCM_AddDevice( )** function.

  Note: You should not parse the unique device name from your application.
- All auto-detectable devices in the system must be detected using either the **NCM_DetectBoards( )** function or the **NCM_DetectBoardsEx( ) f**unction before **NCM_StartDlgSrv( )** can be called to start the Dialogic® System Service.

  Note: Detection is always run automatically via the Plug and Play Observer service that is set to run automatically on system start.
- When using cPCI boards, you can add or remove boards while the system is powered on. However, you must first use the **NCM_StopDlgSrv( )** function to stop the Dialogic System Service and then use the **NCM_DetectBoardsEx( )** function before rebooting the system.

1.3 Dialogic® NCM API Architecture

The Dialogic® NCM API is one layer of a multi-layer configuration management architecture. This architecture provides a vehicle for managing configuration data for Dialogic® products. The components of this architecture are:

- **DCM catalog:** Default configuration information originates in the Dialogic® Configuation Manager (DCM) catalog. This default information includes the devices that can be installed, the configuration parameters that can be applied to them, and the default configuration parameter values. The content of the DCM catalog is determined by the software release of which the Dialogic NCM API is a component. The Dialogic NCM API therefore does not enable you to modify the DCM catalog.

  Throughout this manual, the term "installable" indicates that the configuration data element to which it applies is contained in the DCM catalog. For example, an installable device is a device that is defined in the DCM catalog.

- **System configuration:** The system configuration consists of the configuration data currently in use in your system.

  In this manual, the terms "instantiate" and "instantiation" refer to the process of creating system configuration data.

  The Dialogic devices and configuration parameter values you can instantiate are determined by the DCM catalog. The Dialogic NCM API enables you to instantiate and delete devices and to change the configuration parameter values in your system configuration. The system configuration is read by the Dialogic System Software through the Dialogic NCM API when it initializes Dialogic devices.

  Note: In the current version of the Dialogic NCM API, the system configuration is stored in the Windows® registry. Do not attempt to modify the NCM registry data through any means other than the NCM API. By adhering to this guideline, you ensure forward-compatibility between your application and future versions of the Dialogic NCM API.

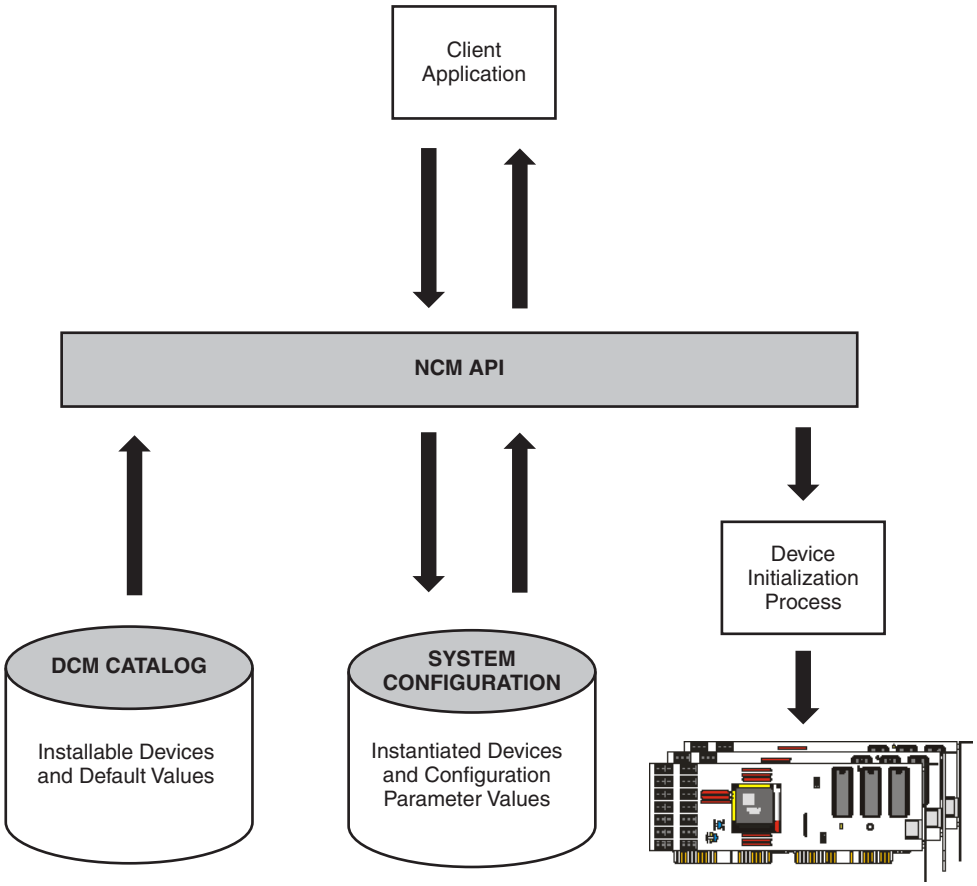
- **NCM API:** The Dialogic NCM API consists of a library of functions for instantiating Dialogic devices in the system configuration and for modifying configuration parameter values. It also enables you to start and stop the system, stop and start individual boards, and to auto-detect devices.

- **Client Application:** A client application makes the functionality of the Dialogic NCM API available to end-users. A client application may be a GUI-based configuration tool, a customized automated silent configuration process, or some other type of application.

  An example of a Client Application is the DCM configuration utility GUI client, which is included in every Dialogic System Software release that includes the Dialogic NCM API. Access the DCM GUI client by clicking the **Configuration Manager-DCM** icon from the **Dialogic System Release** submenu in the Windows® Start menu.

Figure 1 shows the various components that interface with the Dialogic NCM API architecture:

Figure 1. NCM API Architecture



Programming Models 2

This chapter provides information about supported programming models.

All functions in the Dialogic® Native Configuration Manager (NCM) API library run exclusively in synchronous mode. The synchronous programming model uses functions that block application execution until the function completes. This model requires that each device be controlled from a separate process. This allows you to assign distinct applications to different devices dynamically in real time.

Synchronous programming models allow you to scale an application by simply instantiating more threads or processes. This programming model may be easy to encode and manage but it relies on the system to manage scalability.

The only exceptions to the synchronous mode of operation are the **NCM_StartDlgSrv( )** and **NCM_StopDlgSrv( )** APIs. These APIs send a start/stop command to the Dialogic® System Service, but do not wait until the system has started/stopped. The application should check the system state in a loop (via **NCM_GetDlgSrvStateEx( )**) to confirm that start/stop has finished execution.

Event Handling 3

This chapter provides information on handling events that are generated by certain Dialogic® Native Configuration Manager (NCM) API library functions (other than the exceptions noted in Chapter 2, "Programming Models").

All functions in the Dialogic® NCM API operate in synchronous mode, so the start/completion of each function is not determined by events. However, certain functions generate events that are transmitted via the Dialogic® Event Notification framework's ADMIN_CHANNEL or BRIDGING_CHANNEL (for Dialogic® HMP Software only).

You can design your application to receive events from the ADMIN_CHANNEL BRIDGING_CHANNEL. This allows your system management application to be informed when an individual board has started/stopped and when the Dialogic® System or Dialogic® HMP Software System has started/stopped.

The following Dialogic NCM library functions generate events that are carried on the event notification framework's ADMIN_CHANNEL and BRIDGING_CHANNEL:

- **NCM_StartBoard( )**
- **NCM_StartDlgSrv( )**
- **NCM_StopBoard( )**
- **NCM_StopDlgSrv( )**

The events reported by Event Service contain the AUID to identify a device. The Dialogic NCM API normally uses the family and device to identify a device. The Dialogic NCM AUID functions (**NCM_GetAUID( )** and **NCM_GetFamilyDeviceByAUID( )**) provide a mapping from family/device to AUID and vice-versa, thus allowing the Dialogic NCM API to be used in conjunction with Event Service to control the application.

Refer to the *Dialogic® Event Service API Library Reference* and the *Dialogic® Event Service API Programming Guide* for information about registering your application to receive events on the ADMIN_CHANNEL and BRIDGING_CHANNEL.

Error Handling 4

This chapter discusses how to handle errors that can occur when running an application.

All Dialogic® Native Configuration Manager (NCM) API library functions have a return code (**NCMRetCode( )**) to indicate success or failure of the function. A return code of NCM_SUCCESS indicates that the function completed successfully. Any other return value indicates failure.

If a Dialogic® NCM API library function fails, call the **NCM_GetErrorMsg( )** function to process the returned error code. The following sample code shows how to implement error handling into Dialogic NCM API function calls:

```
#include "NCMApi.h"

...

NCMFamily *pFamilies= NULL;

NCMRetCode ncmRc= NCM_GetAllFamilies(&pFamilies);

if (ncmRc == NCM_SUCCESS)
{
   ...
}
else
{
   //process error

   //execute
   ncmErrorMsg *pErrorMsg = NULL;
   ncmRc = NCM_GetErrorMsg(ncmRc, &pErrorMsg);
   if (ncmRc = NCM_SUCCESS)
    {
      printf("Failed to get families: %s\n", pErrorMsg->name);
    }

    //deallocate memory
    NCM_Dealloc(pErrorMsg);
}

//deallocate memory when through with it
NCM_Dealloc(pFamilies);
...
```

For a list of error codes that can be returned by the Dialogic NCM library functions, see the *Dialogic® Native Configuration Manager API Library Reference*. You can also look up the error codes in the *NCMTypes.h* file.

Application Development Guidelines 5

This chapter contains guidelines for developing applications with the Dialogic® Native Configuration Manager (NCM) API. Topics include:

5.1 Configuration Parameter Values and Device Instantiation

The basic unit of configuration data is the configuration parameter value. There are configuration parameter values for each Dialogic® board in your system configuration. When the Dialogic® System Service is initiated, it reads the configuration parameter values through the Dialogic® NCM API from the system configuration and uses them to initialize the devices.

For information about the function of each configuration parameter, consult the online help for the Dialogic® Configuration Manager (DCM) GUI client. Access the DCM GUI client by clicking the **Configuration Manager-DCM** icon from the **Dialogic System Release** submenu in the Windows® Start menu. Access the online help by pressing the **F1** key at any window.

A device is a Dialogic® board, such as a Dialogic® D/240JCT-T1. The Dialogic NCM API enables you to instantiate devices in your system configuration and to query the DCM catalog to determine which configuration parameter values can be set for a given device.

5.2 Configuration Parameter Property Groups

The DCM catalog organizes configuration parameters into groupings called properties. For example, the parameters related to configuring interrupts, memory addresses, and bus slot assignments are grouped together under the **System** property. The **System** property may include the following parameters:

- **AUID**
- **DlgcOUI**
- **InstanceNumber**
- **IntVector**
- **IRQLevel**
- **LogicalID**
- **PciBusNumber**
- **PciID**
- **PciSlotNumber**
- **PLXAddr**
- **PLXlength**
- **PrimaryBoardID**
- **SecondaryBoardID**
- **SerialNumber**
- **SRAMAddr**
- **SRAMlength**
- **SRAMSize**

There are other groups like “Misc” and “TDM Bus Configuration”. The parameters in any given property group vary depending on the Dialogic® System Release Software with which the Dialogic NCM API is provided.

The properties to which configuration parameters belong are determined by the DCM catalog. This relationship cannot be modified through the Dialogic NCM API.

5.3 Configuration Parameter Scope

The DCM catalog defines the scope of configuration parameters so that their value can apply either to one specific device or to a group of devices.

There are three categories of parameter scope:

Note: Refer to Section 5.3.1, “Determining Configuration Parameter Scope”, on page 21 for information about determining a parameter’s scope.

- **Device-Specific:** a device-specific configuration parameter value applies to only one device (board) in the system. When you edit a device specific configuration parameter, the parameter value applies only to that specific device.
- **Family-Level:** a family-level configuration parameter applies to a family of devices (boards) in the system, such as the Dialogic® DM3 board family. At this level, each family of devices has configuration information that is pertinent to the entire family of devices.
- **Global:** global configuration parameter values apply to all "applicable" devices. An applicable device is a device for which the parameter has functional relevance. For example, when you set the value of a global parameter, the value applies to all boards to which the parameter applies.

Overridable configuration parameters can either be treated as global configuration parameters, affecting all applicable devices, or restricted to the device level. For example, by default the **ParameterFile2** parameter affects all applicable devices. But it can also be modified as a device-level parameter. Once the configuration parameter has been modified at the device level, subsequent modifications to the global parameter have no effect at the device level.

The configuration parameter scope is determined by the DCM catalog. It cannot be modified through the Dialogic NCM API.

5.3.1 Determining Configuration Parameter Scope

A configuration parameter's scope determines whether its value applies to all devices, a family of devices, or one specific device.

In order to modify a configuration parameter, you must know its scope. To determine the scope of a configuration parameter, consult the online help accompanying the DCM GUI client by following these steps:

1. Click the **Configuration Manager-DCM** icon from the **Dialogic System Release** submenu in the Windows® Start menu.
2. When DCM GUI client loads, press **F1** to invoke the online help.
3. Click **Help Topics** to invoke the table of contents for the help file.
4. From the DCM online help, click the **Parameter Reference** book.
5. From the **Parameter Reference** book, click **Configuration Parameters**.
6. From the list of parameters, click the name of the parameter you wish to modify.
7. Consult the **Rules** section of the parameter description. The two elements of the **Rules** section relevant to a parameter's scope are:
   - **Scope**: This element indicates whether the parameter's scope is global or device.
   - **Override**: For global parameters, the letter **Y** indicates that the parameter can be overridden on a global basis; the letter **N** indicates that the parameter can not be overridden.

5.3.2 Reading and Writing Configuration Parameter Values

Functions such as **NCM_GetValue( )**, **NCM_GetValueEx( )**, **NCM_SetValue( )** and **NCM_SetValueEx( )** that enable you to read or write a configuration parameter value in the

system configuration require that you specify the parameter's scope. Such functions accept the NCMFamily and NCMDevice data structures as input, and it is through these structures that you specify the parameter's scope.

Set the data structures as follows depending on the type of parameter you wish to modify:

- **device-specific configuration parameters**: NCMDevice should be set to a valid address.
- **family level configuration parameters**: NCMFamily should be set to a valid address.
- **global configuration parameters:** NCMFamily and NCMDevice should be set to NULL.

  Note: The **NCM_GetVariables( )** function can be used to retrieve a list of all global configuration parameters from the DCM catalog by setting both the NCMFamily and NCMDevice structures to NULL.
- **overridable configuration parameters**: to treat the parameter globally, set the value of the NCMFamily and NCMDevice structures as you would a global parameter, both to NULL; to treat the parameter at the device level, set the value of the NCMFamily and NCMDevice structures as you would a device-level parameter, both set to a valid address.

  Note: The DCM catalog maintains two copies of overridable configuration parameters, one at the global level, and another for each device. By default, the device-level copy is updated whenever the global-level copy is modified. But once the device-level copy is modified, its value is de-linked from the global-level copy. Changes to the global-level no longer affect that device.

5.4 Populating Required Data Structures

There are a number of data structures that are necessary in order to perform basic Dialogic NCM API operations. For example, the **NCM_SetValue( )** function, which enables you to change the value of a configuration parameter, requires data structures to identify the family, device, and property to which the configuration parameter to be modified belongs. All required data structures for **NCM_SetValue( )** are aliases for the NCMString data structure.

The following steps illustrate how to populate these data structures:

1. Use **NCM_GetAllFamilies( )** to return a list of NCMFamily data structures; the structures in this list indicate the families for all installable devices defined by the current version of the DCM catalog.
2. Use any one of the NCMFamily data structures as input to **NCM_GetAllDevices( )** to return a list of NCMDevice structures for one of the families designated by the list of NCMFamily structures. Lists of installable devices can be retrieved only for one family at a time.
3. Use the NCMFamily and NCMDevice data structures for a specific device as input to **NCM_GetProperties( )**; this function returns a list of NCMProperty data structures for the device identified by the NCMFamily and NCMDevice data structures. Lists of properties can be retrieved only for one device at time.
4. Use the NCMProperty, NCMFamily, and NCMDevice data structures as input to **NCM_GetVariables( )**; this function returns a list of NCMVariable data structures for the installable device indicated by the specified input structures. The list of NCMVariable data structures contains all the installable configuration parameters within the property for the specified device.

5.5 Device Model Names and Unique Device Names

The NCMDevice structure can be set to a "device model name" or a "unique device name". A device model name is the generic Dialogic name for a device, such as "D/240JCT"for the Dialogic® D/240JCT board. The device model name is necessary to retrieve a list of installable devices with the **NCM_GetAllDevices( )** function.

Note: You should not parse the unique device name from your application.

A unique device name is a unique identifier that you create when you instantiate a device in the system configuration using the **NCM_AddDevice( )** function. The unique device name is necessary to distinguish multiple instances of the same device model in the system.

Dialogic NCM API functions that take a pointer to an NCMDevice structure as input differ with respect to the type of device name they require. These functions fall into the following categories:

- **Functions that write to or read from the system configuration and require a unique device name.** This category includes:
  - **NCM_AddDevice( )**
  - **NCM_ApplyTrunkConfig( )**
  - **NCM_DeleteEntry( )**
  - **NCM_EnableBoard( )**
  - **NCM_IsBoardEnabled( )**
  - **NCM_ReconfigBoard( )**
  - **NCM_SetValue( )**
  - **NCM_SetValueEx( )**
  - **NCM_StartBoard( )**
  - **NCM_StopBoard( )**

  When **NCM_DetectBoards( )** is run, unique device names are automatically created by the NCM framework. You can also create a device name with the **NCM_AddDevice( )** function. You can then retrieve the unique device name with the **NCM_GetInstalledDevices( )** function. The unique device name you retrieve can then be used with the other functions in this category.
- **Functions that read from the DCM catalog and require either a device model name or a unique device name.** This category includes:
  - **NCM_GetProperties( )**
  - **NCM_GetValueRange( )**
  - **NCM_GetValueRangeEx( )**
  - **NCM_GetVariables( )**
  - **NCM_IsEditable( )**

The data provided by the **NCM_GetValue( )** and **NCM_GetValueEx( )** functions is affected by whether NCMDevice is a device model name or a unique device name. If NCMDevice is a device model name, these functions read the default configuration parameter value from the DCM catalog. If NCMDevice is a unique device name, they read the instantiated configuration parameter value from the system configuration.

In the *Dialogic® Native Configuration Manager API Library Reference*, the functions that require an NCMDevice structure as input indicate whether the structure must contain a device model name or a unique device name.

5.6 Dynamic Memory Allocation

Many Dialogic NCM API functions return dynamic data in the form of linked lists, the last item in the list pointing to NULL. In this case, memory space must be allocated to accommodate the linked list. Functions of this type accept a pointer to an address at which to allocate the memory needed to return data to the client. The pointer is declared in the client application.

In order to avoid memory leaks in the application, this memory must be deallocated when it is no longer being used. The **NCM_Dealloc( )** and **NCM_DeallocValue( )** functions can be called by the client application to deallocate the memory dynamically allocated by another API function. Functions that require the use of **NCM_Dealloc( )** and **NCM_DeallocValue( )** are identified as such in the *Dialogic® Native Configuration Manager API Library Reference*.

5.7 Working with Country Specific Parameters

The country-specific configuration parameters behave differently from other configuration parameters. Rather than being stored in individual configuration parameters, the country-specific configuration parameters are concatenated together in a comma-separated string. This string is stored in the **Features** configuration parameter. The countries for which country-specific configuration parameters can be set are stored in the **Country** configuration parameter.

Working with country-specific configuration parameters differs from other configuration parameters in the following ways:

- **You can use special functions for reading country-specific configuration parameters.** A distinct set of functions enables you to read the country-specific configuration parameters contained in the **Features** parameter. These functions are:
  - **NCM_GetCspFeaturesValue( )**, to get the value of a particular country-specific configuration parameter from the system configuration (such as **Frequency Resolution** or **Analog Signaling**) from within **Features**.
  - **NCM_GetCspFeaturesValueRange( )**, to get the valid value range for a specific country-specific configuration parameter code from the DCM Catalog.
  - **NCM_GetCspFeaturesVariables( )**, to get all country-specific configuration parameters contained in the DCM Catalog.
- **You must set the Features configuration parameter using the normal NCM API write functions.** Although you can read the individual country-specific configuration parameters using the parameters outlined above, the **Feature** configuration parameter must be set using the functions described in Section 5.3.2, "Reading and Writing Configuration Parameter Values", on page 21. To change the value of any particular country-specific configuration parameter, your application must modify the parameter within the pointer to a comma-separated list of country-specific configuration parameters and write this string to the **Feature** configuration parameter using the **NCM_SetValue( )** function.

- **The country-specific configuration parameters retrieved for the Country property vary with the value of the Country parameter.** For all other properties, the configuration parameters are retrieved with the **NCM_GetVariables( )** function; the configuration parameters retrieved in this way are those that are applicable to the device name input to this function. In the case of country-specific configuration parameters, it is the value of the **Country** configuration parameter that determines which country-specific configuration parameters belong to the property. You can retrieve a list of valid country-specific configuration parameters for a given country with the **NCM_GetCspFeaturesVariables( )** function.
- **The valid values for the Country configuration parameter must be determined using special functions.** A distinct set of functions enables you to work with country codes and country names. You can use these functions to help set the **Country** configuration parameter, which contains the ISO country code for the country you want to set. The functions are:
  - **NCM_GetCspCountries( )**, to get a list of supported countries from the DCM Catalog.
  - **NCM_GetCspCountryCode( )**, to get the country code for a country from the DCM Catalog.
  - **NCM_GetCspCountryName( )**, to get the country name for a given country code from the DCM Catalog.

5.8 Discovering Installed Devices

By iterating first through all the device families (NCM_GetInstalledFamilies) and then through all of the devices in the family (NCM_GetInstalledDevices), you may programmatically discover each installed device type in a system.

The following steps are used to determine the number and types of boards installed in a system.

1. Use **NCM_GetInstalledFamilies( )** to return a list of all installed device families in your current sytem configuration.
2. Use **NCM_GetInstalledDevices( )** to return a list of all installed devices within a family in your current sytem configuration.

The following sample code returns a list of installed device families, followed by a list of installed devices within a family:

```
void NCM_GetInstalledFamiliesAndDevices()
{
	// Declare & initialize variables
	NCMDevice *pDevices= NULL;
	NCMFamily *pFamilies= NULL;

	// Get all the installed families
	NCMRetCode ncmRc = NCM_GetInstalledFamilies(&pFamilies);
	if (ncmRc == NCM_SUCCESS)
	{
		// Loop through the installed families
		while (pFamilies !=NULL)
		{
			/*
```

```
                    // NOTE: If querying for a specific family, you can
use the following example:

                    if (stricmp(pFamilies->name, "DM3"))
                    {
                           // Found family
                           pFamilies = pFamilies->next;
                           continue;
                    }
                    */

                    cout << "Family:    " << pFamilies->name << endl;

                    // Get all the installed devices for a specific family
                    ncmRc = NCM_GetInstalledDevices(pFamilies,&pDevices);
                    if (ncmRc == NCM_SUCCESS)
                    {
                           // Loop through the installed devices
                           while (pDevices != NULL)
                           {
                                  /*
                                  // NOTE: If querying for a specific
device, you can use the following example:

                                   if (strstr(pDevices->name, "HMP"))
                                  */
                                         // Found device
                                         cout << "- Device:  |- " <<
pDevices->name << endl;

                                  // Get the next installed device
                                  pDevices = pDevices->next;
                           }
                    }
                    else
                    {
                           // Process error
                           cout << "NCM_GetInstalledDevices() failed \n";
                    }

                    cout << endl;

                    // Deallocate memory for the list of the installed
devices
                    NCM_Dealloc(pDevices);

                    // Get the next installed family
                    pFamilies = pFamilies->next;
             }
      }
      else
      {
             // Process error
             cout << "NCM_GetInstalledFamilies() failed \n";
      }
```

```
        // Deallocate memory for the list of installed families
        NCM_Dealloc(pFamilies);
}
```

Clock Master Fallback List 6

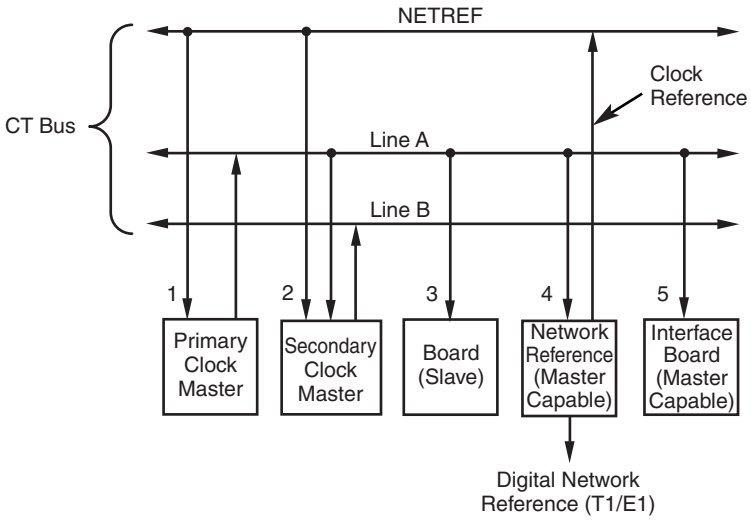
This chapter provides guidelines for using the Dialogic® Native Configuration Manager (NCM) API library to define a TDM bus clock master fallback list.

The Primary Clock Master provides bus timing (bit clock and frame synchronization) to all boards in the system. The Primary Clock Master derives its timing from either a network interface (optimum) or from its own internal oscillator. When clocking is derived from a network interface, the Primary Master Clock uses the CT Bus NETREF signal as the clock reference.

Under normal operation, the Primary Clock Master clock output is re-driven by the Secondary Clock Master, providing redundant backup clocking to all boards in the system should the Primary Clock Master fail.

Figure 2 shows the CT Bus clocking scheme:

Figure 2. CT Bus Clocking



In addition, multiple clock master fallback devices can be defined using the clock master fallback list. The clock master fallback list defines a list of master capable devices in a preferred order. If the current Primary Clock Master should fail, this list is consulted by the system and a new Primary Clock Master is assigned.

The CT Bus includes a primary clock signal line (Line A) and a secondary clock signal line (Line B). Either Line A or Line B can be assigned as the Primary Line (driven by the Primary Clock Master). The remaining line is assigned as the Secondary Line (driven by the Secondary Clock Master). The Primary Line carries clock synchronization to all boards in the system.

Primary and Secondary Clock Masters are always selected automatically by the system. When a clock failure occurs and the clock master fallback list is defined, the list is consulted by the system (without the intervention of the administrative application) to determine the new clock master device. The list is consulted from the first entry down each time to assign the best clock master device available.

If the clock master fallback list is not defined, the system will select a new clock master device on its own, should a failure occur.

For example, if the clock fallback list is defined as follows:

1. Board 1
2. Board 2
3. Board 5
4. Board 4

and Board 2 is the current Primary Clock Master, if a failure should occur on the Primary lines, the system will first check if Board 1 is capable of being the Primary Clock Master before proceeding farther down the list.

Note: If a previously failed clock master recovers, the system will not automatically assign that clock master as the Primary Clock Master.

The clock fallback list is defined using the **NCM_SetClockMasterFallbackList( )** function. Clock fallback clock master sources are defined with the **NCM_SetTDMBusValue( )** function.

Bridge Devices 7

This chapter provides information about programmatically controlling the bridge devices on Dialogic® Host Media Processing (HMP) Interface Boards. Topics are as follows:

7.1 Bridge Devices

Dialogic® HMP Interface Boards have a bridge device that enables communication and media streaming between Dialogic® HMP Software and the boards on the CT Bus.

The Dialogic® Native Configuration Manager (NCM) API provides support for the following:

- Starting a bridge device
- Stopping a bridge device
- Setting a bridge device Dialogic® HMP Software clock master fallback list
- Getting a bridge device Dialogic® HMP Software clock master fallback list

The Dialogic® Event Service API provides a BRIDGING_CHANNEL event notification channel for tracking bridge device state changes. For example, when a bridge device is stopped, the event service generates a DLGC_EVT_BRIDGE_DEVICE_STOPPED event on the BRIDGING_CHANNEL. Refer to the *Dialogic® Event Service API Library Reference* and the *Dialogic® Event Service API Programming Guide* for information about the bridging events.

7.2 Controlling Bridge Devices

Use the Dialogic® NCM API to programmatically control bridge devices. The following sections provide information about the Dialogic NCM API functions used to control bridge devices:

- Starting a Bridge Device
- Disabling a Bridge Device
- Stopping a Bridge Device
- Re-Enabling a Bridge Device

Note: Bridge device settings cannot be modified while the Dialogic® HMP Interface Board is running. Bridge device settings can only be modified when the board is stopped. Refer to the *Dialogic® Host Media Processing Software Administration Guide* for information about using the Dialogic® Configuration Manager (DCM) to start/stop a single board or refer to the *Dialogic® Native Configuration Manager API Library Reference* for information about using the **NCM_StopBoard( )** function to stop a single board.

7.2.1 Starting a Bridge Device

Bridge devices must be started before they can stream media from the Dialogic® HMP Software host to the CT bus. By default, a Dialogic® HMP Interface Board's bridge device is started when the board is started. Dialogic® HMP Interface Boards are started when the DCM or the **NCM_StartSystem( )** function is used to start Dialogic® HMP Software on the target system. Refer to the *Dialogic® Host Media Processing Software Administration Guide* for information about using the DCM to start the Dialogic® HMP Software system. Refer to the *Dialogic® Native Configuration Manager API Library Reference* for information about using the **NCM_StartSystem( )** function to programmatically start the Dialogic® HMP Software system.

7.2.2 Disabling a Bridge Device

Use the following procedure to programmatically disable a board's bridge device:

1. Ensure that either the Dialogic® HMP Interface Board is not running or the Dialogic® HMP Software system is stopped.
2. Use the **NCM_SetValueEx( )** function to change the Dialogic® HMP Interface Board's **BridgeDeviceEnabled** parameter to "No".
3. Start the Dialogic® HMP Software system (if it is stopped) or start the Dialogic® HMP Interface Board (if the Dialogic® HMP Software system is running and the board is stopped). The board's bridge device will be disabled and the bridge device will not start.

7.2.3 Stopping a Bridge Device

Use the following procedure to programmatically stop a board's bridge device:

1. Ensure that the Dialogic® HMP Software system, along with the Dialogic® HMP Interface Board, is started.
2. Use the **NCM_StopBoard( )** function to stop the Dialogic® HMP Interface Board.
3. Use the **NCM_SetValueEx( )** function to change the Dialogic® HMP Interface Board's **BridgeDeviceEnabled** parameter to "No".
4. Use the **NCM_StartBoard( )** function to start the Dialogic® HMP Interface Board. The board's bridge device will be disabled and the bridge device will not start.

7.2.4 Re-Enabling a Bridge Device

Use the following procedure to programmatically re-enable a stopped board's bridge device:

1. Ensure that the Dialogic® HMP Software system, along with the Dialogic® HMP Interface Board, is stopped.
2. Use the **NCM_SetValueEx( )** function to change the Dialogic® HMP Interface Board's **BridgeDeviceEnabled** parameter to "No".
3. Use the **NCM_StartSystem( )** function to start the Dialogic® HMP Software system. The board's bridge device will be disabled and the bridge device will not start.
4. Use the **NCM_StopBoard( )** function to stop the Dialogic® HMP Interface Board.

5. Use the **NCM_SetValueEx( )** function to change the Dialogic® HMP Interface Board's **BridgeDeviceEnabled** parameter to "Yes".
6. Use the **NCM_StartBoard( )** function to start the Dialogic® HMP Interface Board. The board's bridge device will be enabled and the bridge device will start.

7.3 Bridging Device Dialogic® HMP Software Clock Master Fallback List

The bridge device Dialogic® HMP Software clock master fallback list is used to specify which bridge device provides the streaming synchronization to all Dialogic® HMP Interface Boards in the system. To set the bridge device Dialogic® HMP Software clock master fallback list, the application must call the **NCM_SetValueEx( )** function for each board that contains a bridge device. This function call should set the **BridgeDeviceHMPClockMasterFallbackNbrUserDefined** parameter to a number between 0 and 15, where 0 indicates the primary Dialogic® HMP Software clock master fallback bridge device, 1 indicates the secondary Dialogic® HMP Software clock master fallback bridge device, 2 indicates the third Dialogic® HMP Software clock master fallback bridge device and so on.

The **NCM_GetBridgeDeviceHMPClockMasterFallbackList( )** is a convenience function that retrieves the bridge device Dialogic® HMP Software clock master fallback list. The bridge device Dialogic® HMP Software clock master fallback list has no relation to the CT Bus clock master fallback list.

Refer to the *Dialogic® Host Media Processing Software for Windows® Configuration Guide* for additional information about Dialogic® HMP Software clocking and clock fallback.

Building Applications 8

This chapter provides information about building applications using the Dialogic® Native Configuration Manager (NCM) API library. The following topics are discussed:

8.1 Compiling and Linking

The following topics discuss compiling and linking requirements:

- Include Files
- Required Libraries
- Variables for Compiling and Linking

8.1.1 Include Files

Function prototypes and equates are defined in include files, also known as header files. Applications that use Dialogic® NCM library functions must contain statements for include files in this form, where *filename* represents the include file name:

```
#include <filename.h>
```

The following header files must be included in application code prior to calling Dialogic NCM library functions:

NCMApi.h
Contains function prototypes for the Dialogic NCM library. Used for all Dialogic NCM library application development.

devmap.h
Contains equates used to assign AUIDs to boards. Used only if you are invoking the **NCM_GetAUID( )** or **NCM_GetFamilyDeviceByAUID( )** functions in your application.

Note: By default, the header files are located at *<install drive>:\<install directory>\dialogic\inc* or *<install drive>:\<install directory>\dialogic\HMP\inc*.

8.1.2 Required Libraries

You must link the following library file when compiling your Dialogic NCM API application:

NCMApi.lib
Main Dialogic NCM library function

By default, the library files are located at *<install drive>:\<install directory>\dialogic\lib* or *<install drive>:\<install directory>\dialogic\HMP\lib*.

8.1.3 Variables for Compiling and Linking

In Dialogic® System Release 6.0 Software, the following variables were introduced to provide a standardized way of referencing the directories that contain header files and shared objects:

INTEL_DIALOGIC_INC
: Variable that points to the directory where header files are stored.

INTEL_DIALOGIC_LIB
: Variable that points to the directory where shared library files are stored.

These variables are automatically set at login and should be used in compiling and linking commands.

Note: Developers should begin using these variables when compiling and linking applications since they will be required in future releases. The name of the variables will remain constant, but the values may change in future releases.

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