

QUICK REFERENCE GUIDE

National InstrumentsTM Switch Executive

This document contains quick reference information about examples, VIs/functions, route specification strings, and error codes for NI Switch Executive (NISE).

Examples

ICON	VI/FUNCTION NAME AND DESCRIPTION
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Getting Started

Opens a session and makes a route connection.



Interactive Control

Uses many of the API functions through an interactive tool.



Route Specification Syntax Example

Demonstrates the many different aspects of route specifications, including usage of routes, route groups, fully specified routes, and combinations of route types.



Sequenced Connect And Disconnect





Uses Connect and Disconnect to sequence through different switching system states.



Using Find Route to Connect Two Channels

Uses Find Route to determine a path between two channels and then connects the path.

Function†

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	niSE Open Session (niSE_OpenSession)		
			Opens a session to a specified NISE virtual device. Opens communications with all of the IVI switches associated with the specified NISE virtual device. Returns a session handle used to identify the virtual device in all subsequent NISE calls.
	NISEConstString	virtualDeviceName	Name of the NISE virtual device to open a session to
	NISEConstString	options	Used to pass information to each of the IVI devices on startup
	NISESession* [out]	sessionHandle	Reference to virtual device session
<hr/>			
	niSE Close Session (niSE_CloseSession)		
			Reduces the reference count of open sessions by one. If the reference count goes to zero, any open IVI switch sessions are closed.
	NISESession	sessionHandle	Reference to virtual device session
<hr/>			
	niSE Connect (niSE_Connect)		
			Connects the routes specified by the connection specification. When connecting, it may allow for multiconnection based on the multiconnection mode.
	NISESession	sessionHandle	Reference to virtual device session
	NISEConstString	connectSpec	String describing the connections to be made
	NISEInt32	multiconnectMode	<ul style="list-style-type: none">• USE_DEFAULT_MODE (-1)• NO_MULTICONNECT (0)• MULTICONNECT_ROUTES (1)
	NISEBoolean	waitForDebounce	<ul style="list-style-type: none">• NISE_TRUE• NISE_FALSE
<hr/>			
	niSE Connect And Disconnect (niSE_ConnectAndDisconnect)		
			Connects the routes specified by the connection specification. When connecting, it may allow for multiconnection based on the multiconnection mode. Disconnects the routes specified in the disconnection specification. This VI/ function is useful for switching from one state to another state.
	NISESession	sessionHandle	Reference to virtual device session
	NISEConstString	connectSpec	String describing the connections to be made
	NISEConstString	disconnectSpec	String describing the disconnections to be made

† Function names for C, C++, LabWindows™/CVI™, and Visual Basic are in parentheses.

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
niSE Connect And Disconnect (continued)			
	NISEInt32	multiconnectMode	<ul style="list-style-type: none"> • USE_DEFAULT_MODE (-1) • NO_MULTICONNECT (0) • MULTICONNECT_ROUTES (1)
	NISEInt32	operationOrder	<ul style="list-style-type: none"> • BREAK_BEFORE_MAKE (1) • BREAK_AFTER_MAKE (2)
	NISEBoolean	waitForDebounce	<ul style="list-style-type: none"> • NISE_TRUE • NISE_FALSE



niSE Disconnect

(niSE_Disconnect)

Disconnects the routes specified in the disconnection specification.

NISESession	sessionHandle	Reference to virtual device session
NISEConstString	disconnectSpec	String describing the disconnections to be made



niSE Disconnect All

(niSE_DisconnectAll)

Disconnects all connections on every IVI switch device managed by the NISE session reference passed to this function.

NISESession	sessionHandle	Reference to virtual device session
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niSE Find Route



(niSE_FindRoute)

Finds an existing or potential route between channel 1 and channel 2.

NISESession	sessionHandle	Reference to virtual device session
NISEConstString	channel 1	Channel name of one of the end points of the route to find
NISEConstString	channel 2	Channel name of one of the end points of the route to find
NISEBuffer* [out]	routeSpec	Returns the path between the channels if PATH_EXISTS or PATH_AVAILABLE
NISEInt32 * [in/out]	routeSpecSize	<ul style="list-style-type: none"> • Input = size of the route string buffer being passed • Return = the size required to hold the entire route string
NISEInt32 * [out]	routeCapability	<ul style="list-style-type: none"> • PATH_AVAILABLE (1) • PATH_EXISTS (2) • PATH_UNSUPPORTED (3) • RSRG_IN_USE (4) • SOURCE_CONFLICT (5) • CHANNEL_NOT_AVAILABLE (6) • CHANNELS_HARDWIRED (7)

Functions continued on the next page

Functions (continued)

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	niSE_Is Debounced (niSE_IsDebounced)		
			Checks to see if the switching system is debounced or not. This VI/function does not wait for debouncing to occur and returns true if the system is fully debounced.
	NISESession	sessionHandle	Reference to virtual device session
	NISEBoolean* [out]	isDebounced	<ul style="list-style-type: none">• NISE_TRUE• NISE_FALSE
<hr/>			
	niSE_Wait For Debounce (niSE_WaitForDebounce)		
			Waits for all of the switches in the NISE virtual device to debounce.
	NISESession	sessionHandle	Reference to virtual device session
	NISEInt32	maxTime	Amount of time to wait (in ms) for the debounce to complete before timing out

Additional C/C++/Visual Basic Functions

C, C++, and Visual Basic users have two additional functions available that are not needed in LabVIEW.

TYPE	PARAMETER	VALUE TO SET, COMMENTS
niSE_ClearError		
		Clears the last queried error from memory.
NISESession	sessionHandle	Reference to virtual device session
<hr/>		
niSE_GetError		
		Queries for and returns the most recent error.
NISESession	sessionHandle	Reference to virtual device session
NISEStatus* [out]	errorNumber	Returns the error number of the first error that occurred in the session since the error was last cleared
NISEBuffer* [out]	errorDescription	Returns a string describing the error
NISEInt32* [out]	errorDescriptionSize	<ul style="list-style-type: none">• Input = size of the error description buffer being passed• Return = size required to hold entire string

Route Specification Strings

Route specification strings are the paths connecting two channels and are composed of one or more routes delimited by ampersands (&). For example, in the following line of syntax, there are three defined routes or route groups:

```
routeOrGroup & routeOrGroup & routeOrGroup...
```

where `routeOrGroup` can be:

- Route name
- Route group name
- Two endpoint channels to be connected that are delimited by `->`. NISE dynamically determines the path between the endpoints. In this mode, a hardware alias name may be substituted for the endpoints.

```
channel -> channel
```

- Fully specified path enclosed in square brackets consisting of one or more endpoint channels delimited by `->`:

```
[channel -> channel -> channel...]
```

where `channel` can be:

- A channel alias name
- A unique name created by combining the IVI device logical name and IVI channel name separated by a forward slash (/) delimiter. For example, (device/iviChan).



- Note**
- Any `channel`, other than an endpoint, within a route specification string *must* be reserved for routing or directly hardwired to one of the endpoint channels.
 - Channels used as endpoints must *not* be reserved for routing channels.
 - When connecting a route, the list of channels must obey the exclusion rules by both explicitly in the route specification string, as well as implicitly by any previous connections. Exclusion violations result in an error.

The following are samples of route specification strings for a matrix:

- [SampleMatrix1/c0->SampleMatrix1/r1->SampleMatrix1/c4]
- [Scope->R3->SampleMatrix1/c6]
- ArbToInput & ScopeToOutput
- PowerDevice & [Scope->R3->UUT_Out]
- DCPower->UUT_Vcc

Each supported ADE has an associated Route Specification String Example. Refer to the examples for the appropriate ADE to see how route specification strings are used when programming.

Error Codes

VALUE (HEX)	VALUE (DECIMAL)	DESCRIPTION
INTERNAL		
FFFF8EB8	-29000	An internal error has occurred. Please contact National Instruments technical support.
IVI_DRIVER_NO_SIMULATION		
FFFF8EB7	-29001	The IVI-specific driver does not support simulation mode.
INVALID_VIRTUAL_DEVICE_NAME		
FFFF8EB6	-29002	The specified NI Switch Executive virtual device is invalid or does not exist.
INVALID_SESSION		
FFFF8EB5	-29003	This session is not a valid NI Switch Executive virtual device session.
INSUFFICIENT_SYSTEM_RESOURCES		
FFFF8EB4	-29004	NI Switch Executive requires system resources that are currently unavailable. Close other applications and try again.
AMBIGUOUS_NAME		
FFFF8EB3	-29005	The specified name is ambiguous. Specify a unique name.
INVALID_IVI_LOGICAL_NAME		
FFFF8EB2	-29006	The IVI logical name is invalid or the device does not exist.
INVALID_ROUTE_SPECIFICATION		
FFFF8EB1	-29007	The route specification string contains invalid characters or could not be understood.
EVAL_TIMED_OUT		
FFFF8EAF	-29008	NI Switch Executive is running with an evaluation license and the time limit for this session has expired. Restart your application to continue evaluating.
INVALID_NAME		
FFFF8EAE	-29009	The name contains invalid characters.
RUNTIME_IMPORTING_EVAL		
FFFF8EAD	-29010	This configuration was created with an evaluation license. Deployment licenses can only import configurations created with a development license. Import the configuration into a development license system and re-export the file to resolve the problem.
EVAL_EXPIRED_IMPORTING		
FFFF8EAC	-29011	NI Switch Executive cannot import configurations once the evaluation period has expired.
RUNTIME_EXPORTING		
FFFF8EAB	-29012	NI Switch Executive deployment licenses cannot export configurations. The operation requested requires a development license.
IMPORTING_FILE_ACCESS		
FFFF8EAA	-29013	There was an error when accessing (open or read) the NI Switch Executive configuration file.

VALUE (HEX)	VALUE (DECIMAL)	DESCRIPTION
IMPORTING_FILE_FORMAT		
FFFF8EA9	-29014	The file is not a valid NI Switch Executive configuration file.
INVALID_END_POINTS		
FFFF8EA8	-29015	The endpoints of the path do not match the existing endpoints.
INVALID_PATH		
FFFF8EA7	-29016	Cannot connect this path on the device.
INVALID_CHANNEL_SPECIFICATION		
FFFF8EA6	-29017	The channel specification string contains invalid characters or could not be understood.
DLL_NOT_FOUND		
FFFF8EA5	-29018	A needed DLL was not found. Check to ensure that NI Switch Executive is properly installed and that all needed DLLs are in the search path.
FUNCTION_NOT_FOUND		
FFFF8EA4	-29019	A needed function in a DLL could not be found. Although the DLL exists, it may be an incorrect version and may not contain the needed function.
MAX_TIME_EXCEEDED		
FFFF8EA3	-29020	One or more switching devices have not debounced within the specified maximum time.
ROUTE_ALREADY_EXISTS		
FFFF8EA2	-29021	The route you are trying to connect or a route with the same endpoints is already connected.
ROUTE_EXISTS_AS_UNSHAREABLE		
FFFF8EA1	-29022	The route you are trying to connect already exists as a non-multiconnect route. It must be disconnected before you can make a multiconnect route.
ROUTE_EXISTS_BY_DIFFERENT_PATH		
FFFF8EA0	-29023	The route you are trying to connect already exists but is connected through a different path than the one specified.
ROUTE_DOES_NOT_EXIST		
FFFF8E9F	-29024	The specified route does not exist. You cannot disconnect a route that does not exist.
PARTIAL_DISCONNECT		
FFFF8E9E	-29025	Device specific errors occurred during the disconnect operation.
RESOURCE_IN_USE		
	-29026	A connection could not be made because one of the switch resources needed to make the connection is used as part of another currently connected route.
FILE_WRITE		
FFFF8E9D	-29027	An error occurred while attempting to write to file.

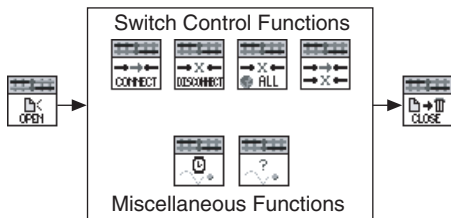
Error Codes continued on the next page

Error Codes (continued)

VALUE (HEX)	VALUE (DECIMAL)	DESCRIPTION
FILE_READ		
FFFF8E9C	-29028	An error occurred while attempting to read from file.
INVALID_MULTICONNECT_MODE		
FFFF8E9B	-29029	Invalid multiconnect mode.
INVALID_OPERATION_ORDER		
FFFF8E9A	-29030	Invalid operation order.
CONFIG_CHANNEL_CONFLICT		
FFFF8E99	-29031	A reserved for routing channel required for connecting this route is already in use by another route.
SOURCE_CHANNEL_CONFLICT		
FFFF8E98	-29032	Connecting this route would cause excluded channels to be shorted together.
ROUTE_EXISTS_WITH_DIFFERENT_MODE		
FFFF8E97	-29033	The route you are trying to connect already exists with a different multiconnect mode. It must be disconnected before you can make this connection.
DISABLED_CHANNEL		
FFFF8E96	-29034	The channel you are trying to use has been disabled for this virtual device.
CANNOT_CONNECT_TO_ITSELF		
FFFF8E95	-29035	You cannot connect a channel to itself. Either your endpoint channels are the same or they reside on the same hardware.
ROUTE_NOT_FOUND		
FFFF8E94	-29036	Route cannot be found between the specified endpoints.

Programming Flow

The following diagram shows a typical programming flow for NI Switch Executive.



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