Fieldbus

NI-FBUS™ Offline Configurator User Manual

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FCC/Canada Radio Frequency Interference Compliance

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Consult the FCC Web site at `www.fcc.gov` for more information.

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Federal Communications Commission

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This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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* The CE marking Declaration of Conformity contains important supplementary information and instructions for the user or installer.

Conventions

The following conventions are used in this manual:

»	The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.
	This icon denotes a tip, which alerts you to advisory information.
	This icon denotes a note, which alerts you to important information.
bold	Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.
Fieldbus	The generic term *Fieldbus* refers to any bus that connects to field devices. This includes Foundation Fieldbus, CAN, DNET, and Profibus. In this manual, the term *Fieldbus* refers specifically to the Foundation Fieldbus.
italic	Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text that is a placeholder for a word or value that you must supply.
`monospace`	Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and code excerpts.

Contents

1

NI-FBUS Offline Configurator Overview

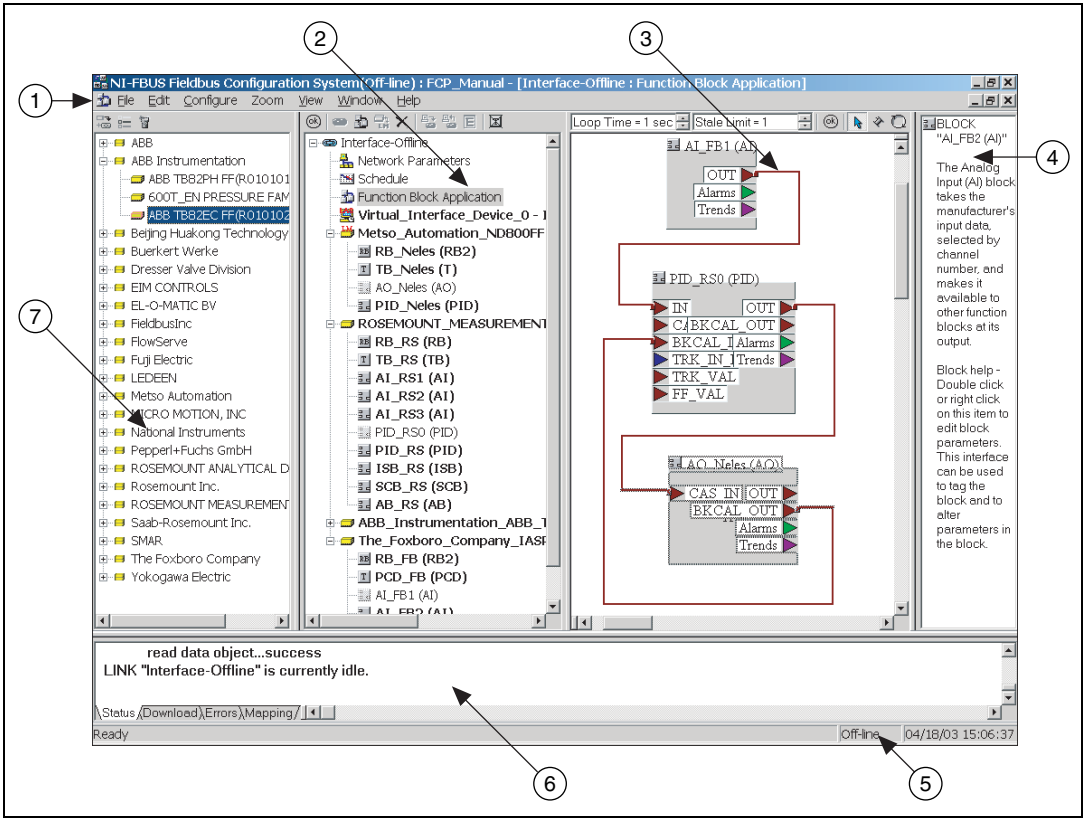
This chapter introduces the NI-FBUS Offline Configurator, lists some of its main features, and describes the main windows of the application. This manual is written for persons already familiar with Windows 2000/NT/XP and the *Foundation Fieldbus Overview* document, and who are otherwise familiar with using Foundation Fieldbus.

Introduction to the NI-FBUS Offline Configurator

You can use the NI-FBUS Offline Configurator to configure a Foundation Fieldbus network and keep track of your configuration changes. The NI-FBUS Offline Configurator is a graphical environment for creating linkages, loops, and a schedule based on the concepts described in the *Foundation Fieldbus Overview* document.

NI-FBUS Offline Configurator Windows

The NI-FBUS Offline Configurator has three resizable windows within the main window: the configuration tree, help window, and status window. You can open additional specialty windows in the middle frame to configure your function block applications, change parameters, and update the schedule. You also can open separate windows for block parameter adjustment on top of the main window. Figure 1-1 shows elements of the NI-FBUS Offline Configurator main window.



1	Object Menu (Changes Based on Object Selected in Configuration Tree)	4	Help Window
2	Configuration Tree	5	Run Mode of Current Project
3	Middle Frame	6	Status Window
		7	Device Type Tree

Figure 1-1. Elements of the NI-FBUS Offline Configurator Main Window

At the upper-right corner of the screen are two sets of resize buttons. The outer set of buttons controls the NI-FBUS Configurator, and the inner set controls the currently active window in the middle frame. If you cannot see other windows in the middle frame, minimize the active window.

Refer to the *NI-FBUS Configurator User Manual* for more information.

Device Type Tree

The device tree window, which appears to the left of the configuration tree, shows the existing virtual device types already imported into NI-FBUS as shown in Figure 1-2.

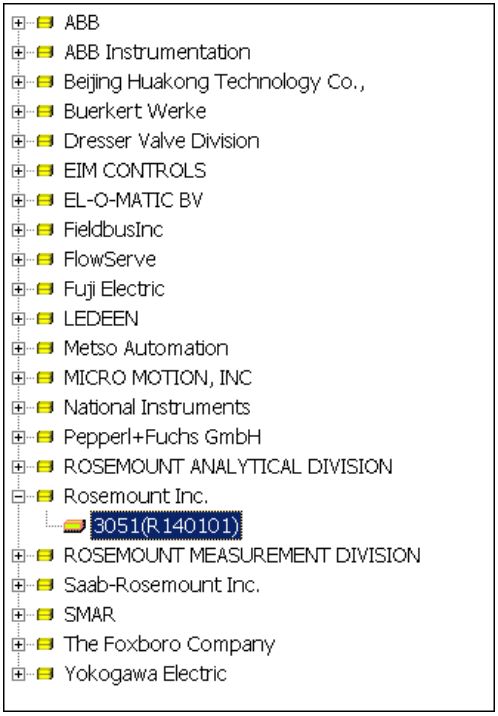


Figure 1-2. Existing Virtual Device Types in the Device Tree Window

The device types are grouped by vendor name. Click the + symbol to view the device types belonging to each manufacturer.

Configuration Tree

Unlike in the online version of NI-FBUS, the configuration tree does not appear on the upper left of the NI-FBUS configurator window. It appears between the device type tree and middle frame.

Run Mode of Current Project

The run mode indicates the run mode of the current active project. **Offline** means the current project is running in offline mode, while **Online** means it is running in online mode.

Note You can dock the configuration tree on the left side of the main window. To do so, select **View»Preferences**, select the **General** page, and check the **Dock Device Type Window in the Right Side** box to keep the device type window on the right side. In addition, when NI-FBUS Configurator quits, the latest information in the status window, download window, and mapping window are automatically recorded in the `statuslog.txt`, `downloadlog.txt`, and `maplog.txt` files, respectively. However, all previous information is overwritten.

Refer to the *NI-FBUS Configurator User Manual* for more information.

2

Device Descriptions

The device description files contain information about the types of blocks and parameters your Fieldbus device supports, along with online help describing the uses of given parameters.

Importing Device Descriptions

If your Fieldbus device uses manufacturer-specific device description files that shipped with the device or are available from the device manufacturer, you must import them. To do so, complete the following steps:

1. Insert the device description disk or CD (if supplied by your Fieldbus device manufacturer) into the disk drive of the host computer.
2. Select **Start»Programs»National Instruments»NI-FBUS» Interface Configuration Utility** to run the Interface Configuration utility. The utility appears in Figure 2-1.

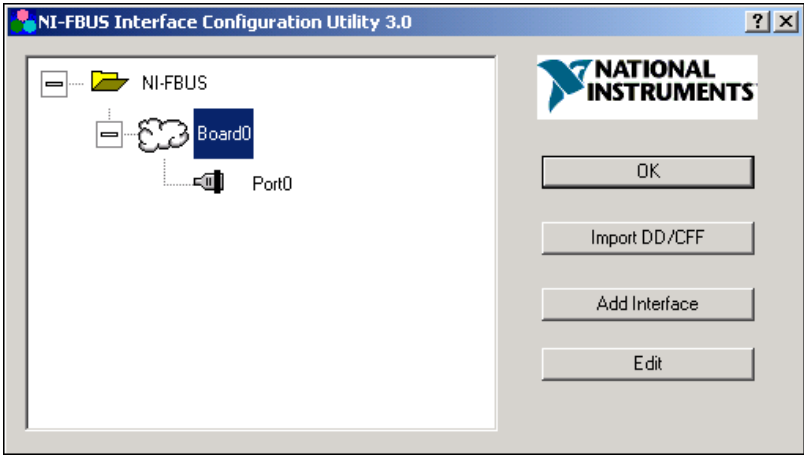


Figure 2-1. NI-FBUS Interface Configuration Utility

3. Click the **Import DD/CFF** button. The Import DD/CFF dialog box appears as shown in Figure 2-2.

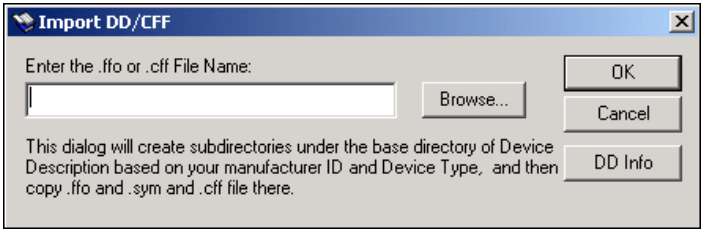


Figure 2-2. Import DD/CFF Dialog Box

4. Click the **DD Info** button. The DD Info dialog box appears as shown in Figure 2-3.

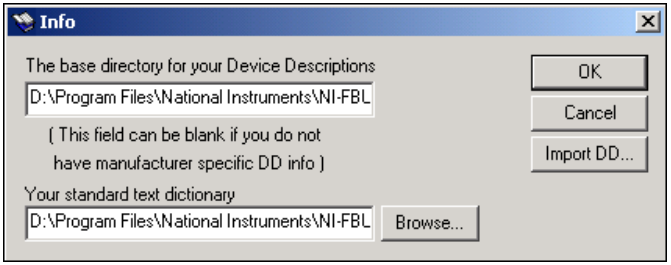


Figure 2-3. DD Info Dialog Box

5. If the base directory field is blank, enter a base directory. The base directory you enter here is where NI-FBUS looks for all device descriptions. Do not change the base directory after you have started importing device descriptions; otherwise, NI-FBUS cannot find the device descriptions you previously imported. Your device description files are automatically placed in the appropriate manufacturer ID subdirectory under this base directory. Your base directory includes one folder for each manufacturer for which you have imported a device description. For example, if you import the device description for the National Instruments FP-3000 device, you will find a folder called `4e4943`. This is the National Instruments Foundation Fieldbus device manufacturer ID number. The next layer of folders is the device type. For example, the FP-3000 has a device type ID number of 4005. Underneath this layer of directories, you will find the individual device description files and capability file (`.ffo`, `.sym`, and `.cff`).

6. If necessary, click the **Browse** button to select the standard text dictionary provided with NI-FBUS. The text dictionary has a `.dct` extension.

7. Click the **Browse** button in the Import DD/CFF dialog box and select **All Files (*.*)** in the **Files of type** pull-down menu. Browse to the `.cff` capability file as shown in Figure 2-4 and click **Open**.

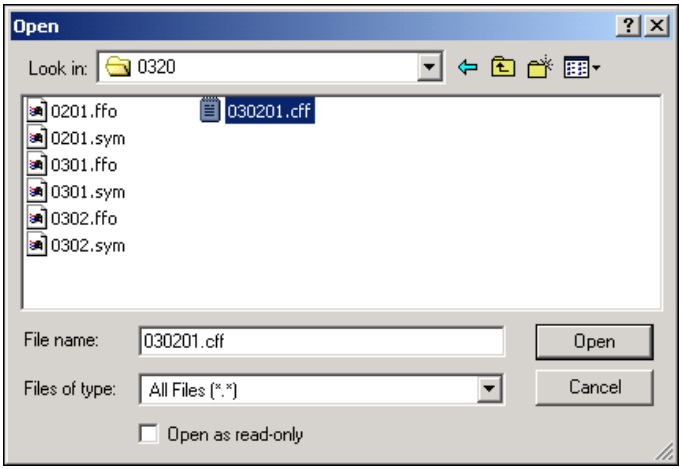


Figure 2-4. Selecting the Capability File

Typically, the device description files and capability file for your Fieldbus device are supplied on a disk from the manufacturer. For each device, there is one capability file (`.cff`) and two device description files, one ending in `.ffo` and one in `.sym`. Select the `.cff` file. The corresponding `.ffo` and `.sym` files are imported automatically. The filename has six digits and a `.cff` extension (for example, `030101.cff`).

Note If you are importing device descriptions and capability files for multiple devices, you might see that they can have the same filenames. Each file contains information about the device and its manufacturer, and is placed appropriately in the hierarchy under the base directory.

8. Click **OK**. A window appears, giving the full path to which the `.cff`, `.ffo`, and `.sym` files were copied.
9. Click **OK** again.

For more information about device descriptions, refer to the *Device Descriptions* section of the *Foundation Fieldbus Overview* and *Foundation Specification Common File Format (FF-103)* documents.

3

Using the NI-FBUS Offline Configurator

The tutorials in this chapter give you first-hand experience with the NI-FBUS Offline Configurator.

Before you begin these exercises, make sure you have successfully installed all Fieldbus hardware and software and have properly imported the device descriptions for the devices you want to use.

Start the NI-FBUS Offline Configurator and NIFB Process

1. Install the NI-FBUS Offline Configurator software in your machine.
2. Import the device descriptions and capability files.
3. Select **Start»Programs»National Instruments»NI-FBUS» NI-FBUS Interface Configuration Utility** to start the NI-FBUS Interface Configuration Utility. Click **Add Interface**. The dialog box in Figure 3-1 appears.

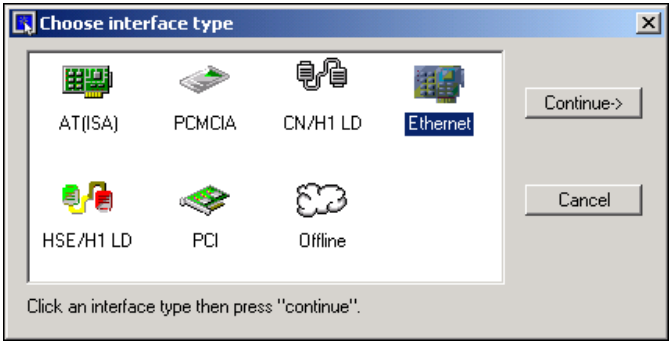


Figure 3-1. Choosing an Interface Type

4. Select **Offline** and click **Continue** to add an offline virtual interface. You can point out or click **OK** to use the node address given in the dialog box. The offline configurator installer already may have installed an offline virtual interface. In this situation you do need to add an extra interface.

Note NI-FBUS cannot work with any physical interface in the offline state. Remember to delete any existing physical interfaces before you add an offline interface. Only one offline interface is supported in the current version.

5. To start the NI-FBUS Offline Configurator, select **Start»Programs»National Instruments»NI-FBUS»NI-FBUS Configurator**. When a dialog box appears, click **Off-line Mode** to start `NIFB.EXE` with the offline mode as shown in Figure 3-2.

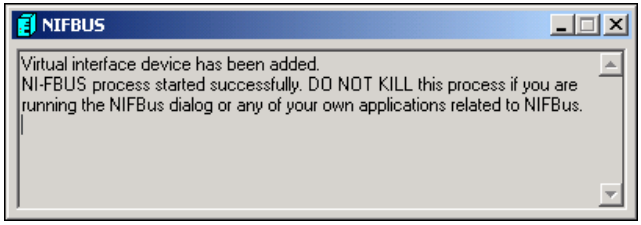


Figure 3-2. Starting the NI-FBUS Offline Communications Manager

Create a New Project

1. When you start the NI-FBUS Configurator, the Add Links dialog box appears automatically. To create a new project at any other time, select **File»New**.

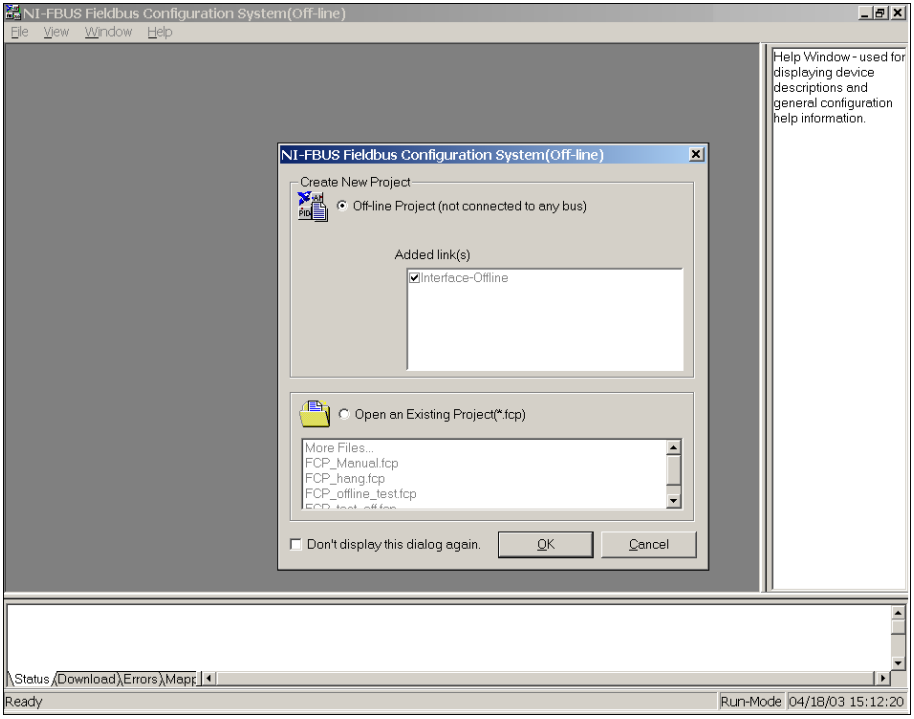


Figure 3-3. Create a New Project

You should close any open projects before opening or creating another project. The multiple window structure of the NI-FBUS Configurator quickly becomes confusing with multiple open projects.

2. In the Add Links dialog box, each configured interface appears. Select the link or links (ports on your Foundation Fieldbus interface) you want to include in your project in the **Added link(s)** checklist.

3. Select the type of project to create as shown in Figure 3-4. Usually, this type is offline.

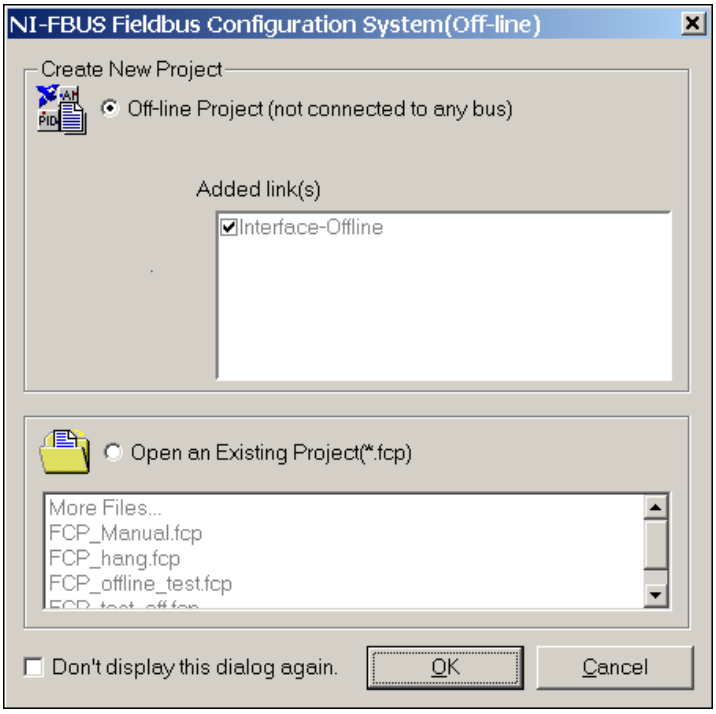


Figure 3-4. Project Type Selection

4. Click **OK**.

Add Virtual Devices

1. Drag the device you want to add into the current project from the left window (device type tree) and drop it into the middle window (project window). The device list windows show the devices in hierarchy and group the devices from the same vendor under a folder. You can right-click the device types and select **Property** to view detailed information as shown in Figure 3-5.

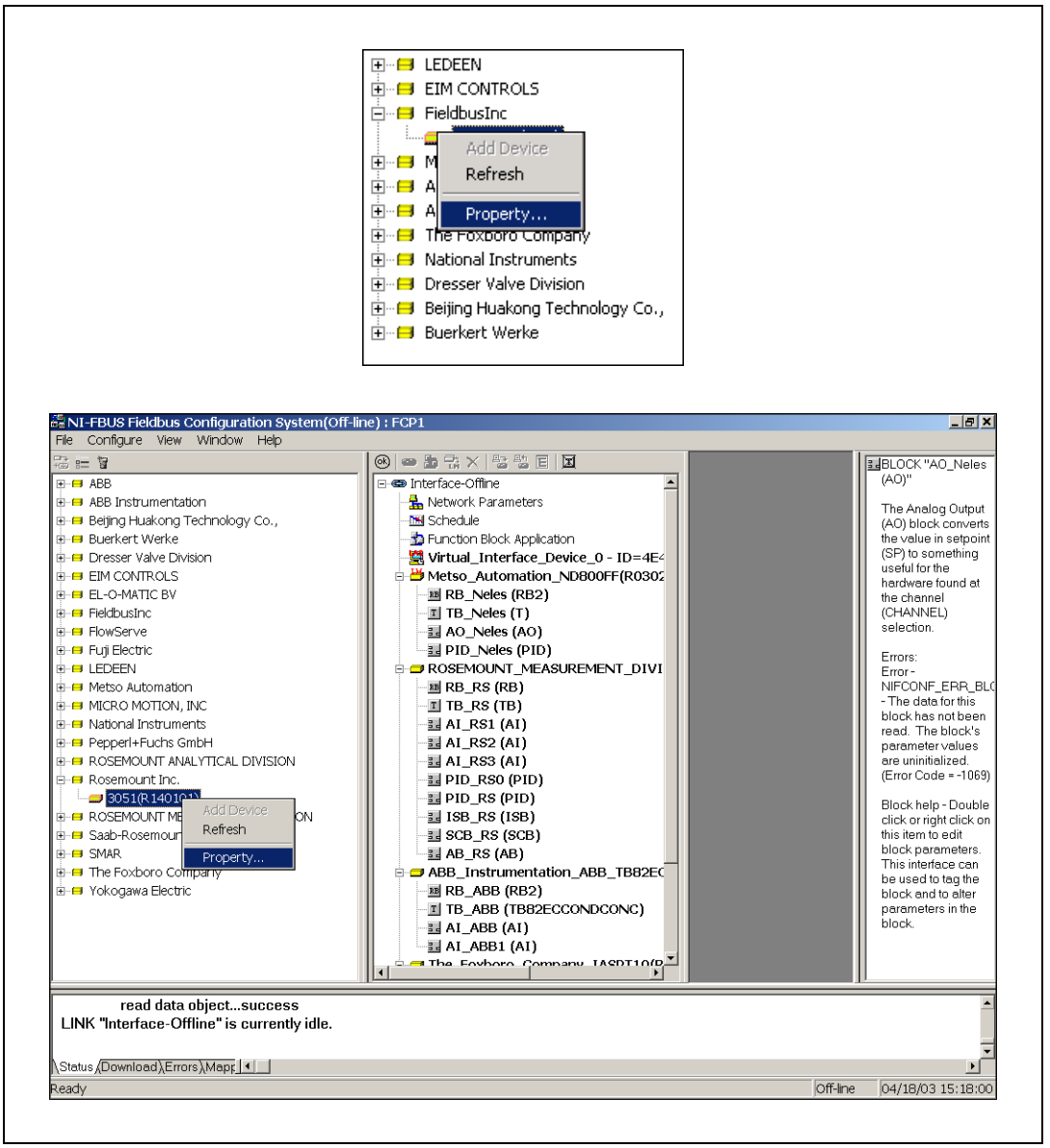


Figure 3-5. Adding Virtual Devices

2. When a virtual device is dropped into the project window, the following window prompts the user to set the FF network address and tag of the virtual device. The NI-FBUS Offline Configurator sets the default values. You can simply use the default address and tag, for they have been checked to ensure no repetition with other offline devices. You also can fill in the desired address and device tag, then click **OK** to add this virtual device as shown in Figure 3-6.

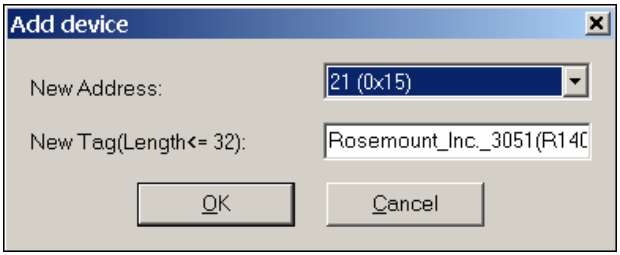


Figure 3-6. New Address and New Tag

3. The NI-FBUS Offline Configurator creates a virtual interface and multiple virtual devices added by the user. The virtual devices are created from DD and CFF files. If you provide incorrect DD or CFF files, the corresponding virtual device may not work properly, as shown in Figure 3-7.

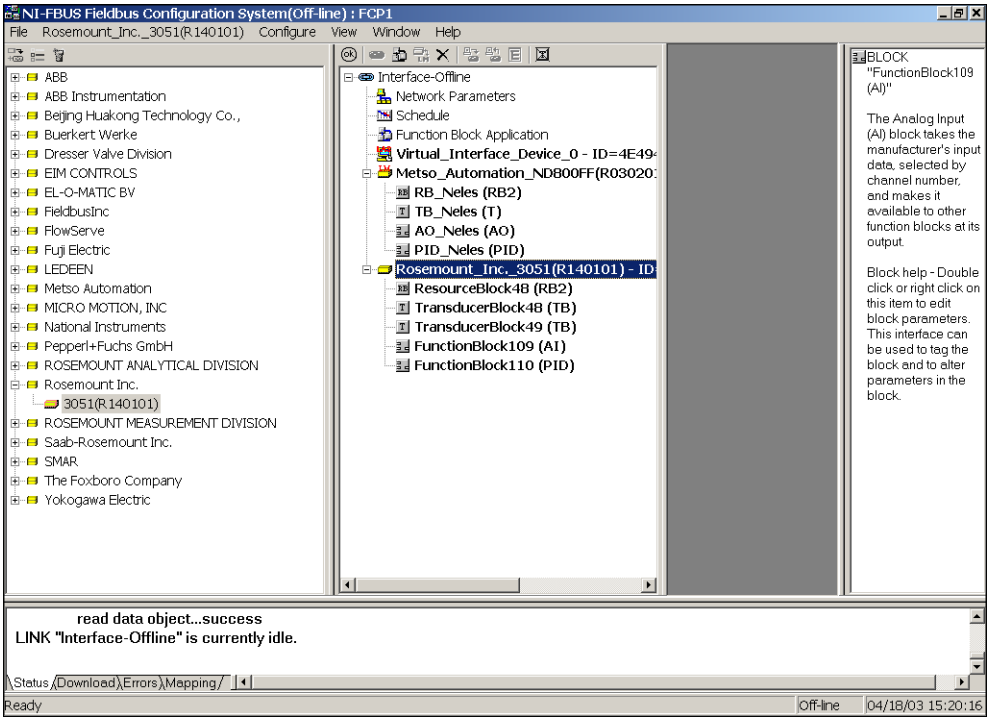


Figure 3-7. Virtual Devices Added Into Fieldbus

Configure Function Block Application

After the desired virtual devices have been created by the NI-FBUS Offline Configurator, you can configure your function block application.

1. Select **Function Block Application** in the project window containing the configuration tree.
2. Select **Start»Programs»National Instruments»NI-FBUS»Manuals** to view the *NI-FBUS Communications Manager User Manual* for detailed configuration information.
3. After you make the configuration, you can save the project into a `*.fcp` file. This file can be transported to other machines for mapping and downloading.

Mapping and Downloading

As used here, mapping means mapping the virtual devices into physical devices. You must do the mapping in the online state, meaning you must have a physical interface and devices. Complete the following steps to map and download:

1. Select S**tart»Programs»National Instruments»NI-FBUS» NI-FBUS Interface Configuration Utility** to start the NI-FBUS Interface Configuration Utility. Add your physical interfaces (either AT, PCMCIA, or PCI interfaces).
2. Select **Start»Programs»National Instruments»NI-FBUS» NI-FBUS Configurator** to start the NI-FBUS Configurator. The configurator will ask you select the run mode. Click **Online Mode** to start it.
3. As the Configurator launches, check the **Open** option in the startup dialog box and open the `.fcp` file you saved in the Offline Configurator. A window prompts you to initialize the link, as shown in Figure 3-8.

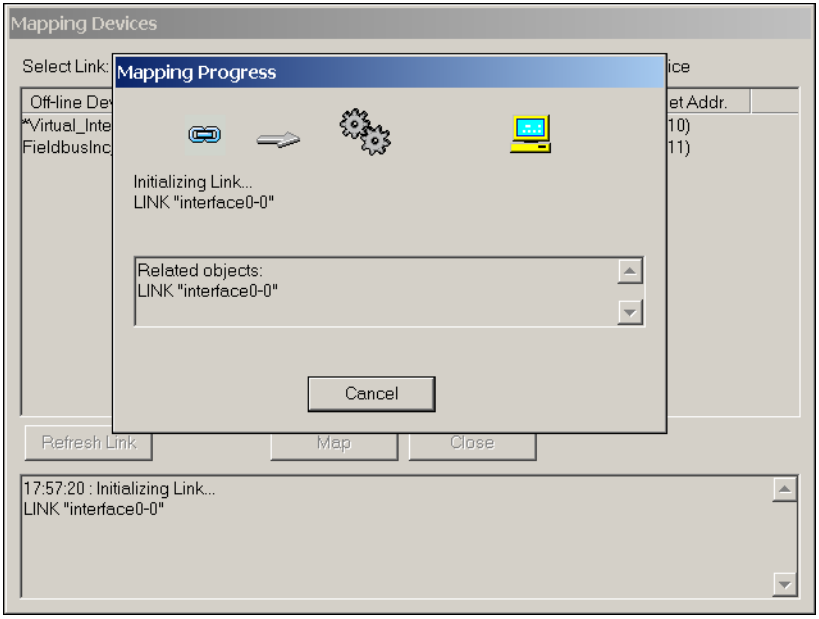


Figure 3-8. Initializing the Link

4. After the link initializes, a list shows the virtual (offline) devices versus physical (online) devices. You can select the strategy to decide which device's address to use as the target, as shown in Figure 3-9.

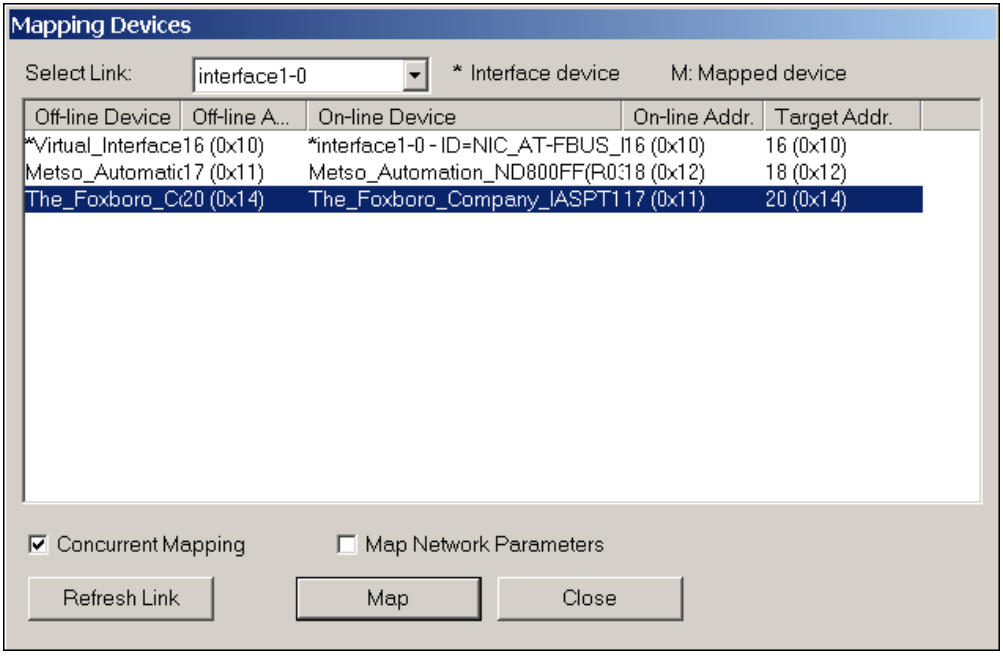


Figure 3-9. Select Target Tags and Addresses

5. After you set target addresses, click **Map** to begin the mapping. With **Concurrent Mapping** checked, all selected devices are mapped in parallel to speed up the mapping process. You can uncheck this box to map the devices one by one. (The default mode is concurrent.) With **Map Network Parameters** checked, the network parameters in the selected link are mapped. However, *only* the network communication parameters are mapped. The error values set up in the virtual link to be mapped to the physical link can make the communication unstable. Therefore, uncheck this box if you are not sure the network parameters are correct. (The default state is unchecked.)

   In addition, before the mapping, the program automatically backs up the offline project to another file with `_off` added to the name. (For example, if the original file is `C:\org.fcp`, the backup file is `C:\org_off.fcp`). The NI-FBUS configurator erases the devices with conflicting tags or addresses, then maps the virtual offline devices to physical online devices, as shown in Figure 3-10.

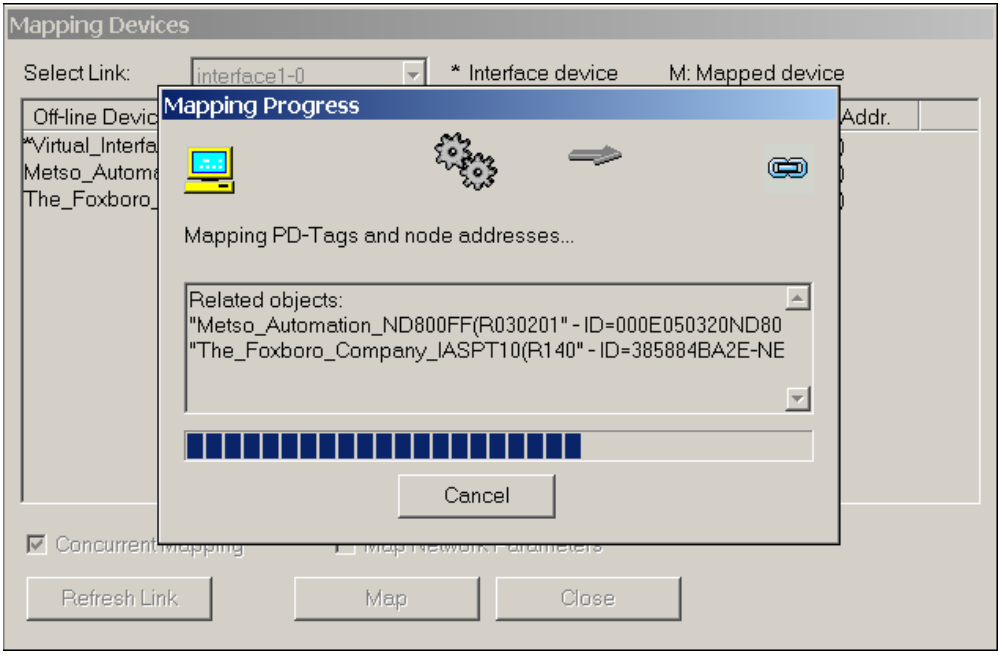


Figure 3-10. Erase Conflicts and Perform Mapping

6. After all the virtual devices you selected are mapped (you can have more or fewer physical devices than virtual devices), the mapping ends, as shown in Figure 3-11.

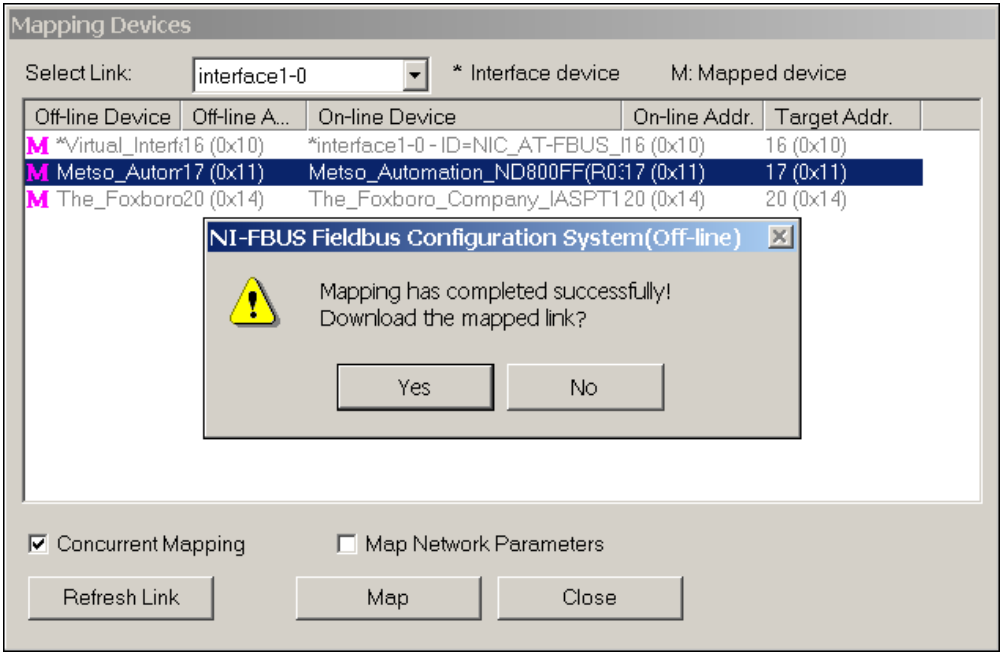


Figure 3-11. Partially Mapped Link

The grayed item with a red *M* at the beginning of the row indicates that the device has been mapped. Select **Yes** to download the configuration immediately, or **No** to end the mapping. To download the configuration later, select **Download All** from the menu.

Tip To log the information created while mapping and downloading, select **View» Preferences**. On the **Log Settings** page, input the log filenames, click the **Start Log** button, and click **OK**.

Note In the process of mapping, some parameter value errors may occur. Generally, you can ignore them and continue or try to do mapping again. In addition, both mapping warnings and errors are recorded in the mapping status window, which is helpful in verifying the mapping.

A

Error Messages and Warnings

This appendix lists error messages and warnings you might receive while using the NI-FBUS Configurator and describes the error messages and warnings.

Error Messages

If you receive an error message while using the NI-FBUS Configurator, refer to this section for a description of the error and possible solutions.

NIF_ERR_ALARM_ACKNOWLEDGED

The alarm has already been acknowledged.

NIF_ERR_BAD_ARGUMENT

The value you gave is not of the correct data type.

NIF_ERR_BAD_DEVICE_DATA

The device returned inconsistent information.

NIF_ERR_BUF_TOO_SMALL

The buffer does not contain enough entries to hold all the information for the blocks. If you receive this error, buffer entries that you allocated did not contain valid block information when the call returned.

NIF_ERR_COMM_ERROR

An error occurred when NI-FBUS tried to communicate with the device.

NIF_ERR_CONFIG_ERROR

Some configuration information, such as Windows registry information or network configuration information, is incorrect.

NIF_ERR_DATA_NEVER_WRITABLE

The specified object is read-only.

NIF_ERR_DEVICE_NOT_PRESENT

The requested device is not operational.

NIF_ERR_EXCEED_LIMIT

The device reported that the value exceeds the allowable limit during a write operation.

NIF_ERR_INVALID_DESCRIPTOR

The descriptor you gave is invalid.

NIF_ERR_MULTIPLE

There are duplicate block tags.

NIF_ERR_NOT_FOUND

NI-FBUS could not find the specified object.

NIF_ERR_OBJECT_ACCESS_DENIED

The Fieldbus interface does not have the required privileges. The access group you belong to is not allowed to acknowledge the event, or the password you entered is incorrect.

NIF_ERR_OBJECT_ACCESS_UNSUPPORTED

The device does not support write access to this object.

NIF_ERR_OBSOLETE_DESC

The input descriptor is no longer valid. It was closed before a function completed.

NIF_ERR_ORDINAL_NUM_OUT_OF_RANGE

The ordinal number is out of the device's range.

NIF_ERR_PARAMETER_CHECK

The device reported a violation of parameter-specific checks.

NIF_ERR_RESOURCES

NI-FBUS is unable to allocate some system resource; this is usually a memory problem.

NIF_ERR_SERVER_CONNECTION_LOST

The session established with NI-FBUS for this descriptor has been closed or lost.

NIF_ERR_SERVER_NOT_RESPONDING

Either the NI-FBUS server has not been started, or the server, in its current state, cannot respond to the request.

NIF_ERR_SM_NOT_OPERATIONAL

The device is present, but cannot respond because it is at a default address.

NIF_ERR_SYMBOL_FILE_NOT_FOUND

NI-FBUS could not find the symbol file.

NIF_ERR_TIMEOUT

The device containing the object is present but did not respond within the timeout period.

NIF_ERR_WRITE_IS_PROHIBITED

The device reported that the `WRITE_LOCK` parameter value is set.
The `WRITE_LOCK` parameter prohibits writing to the `name` parameter.

NIF_ERR_WRONG_MODE_FOR_REQUEST

The device reported that the current function block mode does not allow you to write to the parameter.

NIFCONF_ERR_ADDRESS_OUT_OF_RANGE

This address does not fit in the allowable range of addresses.

NIFCONF_ERR_ADDRESS_USED

This address is already taken.

NIFCONF_ERR_BAD_WIRE

This wire is not completely attached to an output and input(s).

NIFCONF_ERR_BLOCK_SCHEDULE_CONFLICT

A block in this device is already scheduled for this time. Do not schedule more than one block in the device at the same time.

NIFCONF_ERR_BUF_TOO_SMALL

The buffer is too small.

NIFCONF_ERR_CONFIGURING

You are configuring this project. If you get this error, stop configuring the project to continue.

NIFCONF_ERR_CONFUSED_WIRE

This wire is not working. The NI-FBUS Configurator has removed it.

NIFCONF_ERR_CORRUPT_FILE

The NI-FBUS Configurator found a corrupt file object.

NIFCONF_ERR_COULD_NOT_DETERMINE_SCHEDULE

The NI-FBUS Configurator cannot fit the schedule of the loop into the current schedule. Usually, insufficient time or poor choice of loop times cause this error. Use integer multiples such as 1, 2, 4, and so on, instead of multiples like 5, 7, 13, and so on, to solve this problem.

NIFCONF_ERR_COULD_NOT_START_THREAD

The NI-FBUS Configurator is unable to start a new thread.

NIFCONF_ERR_DD_SIZE_MISMATCH

The actual data size does not match the device description data size.

NIFCONF_ERR_DEVICE_NOT_ALIVE

The device is not responding.

NIFCONF_ERR_DOWNLOAD_INCOMPLETE

The link is only partially configured.

NIFCONF_ERR_DUPLICATE_ADDRESS

The address for this device was found elsewhere in the configuration file. Duplicate addresses are not allowed on a Fieldbus link.

NIFCONF_ERR_DUPLICATE_TAG

The tag for this object was found elsewhere in the configuration file. Duplicate tags are not allowed on a Fieldbus link.

NIFCONF_ERR_INCOMPATIBLE_VERSION

This file was made with a newer version of the NI-FBUS Configurator. There might be unpredictable problems with the project.

NIFCONF_ERR_INVALID_MACROCYCLE

This macrocycle conflicts with a previously defined macrocycle.

NIFCONF_ERR_INVALID_NUMBER

This is an invalid number. A number can use the digits 0–9 and the letters A–F. Hexadecimal numbers can be preceded with `0x`.

NIFCONF_ERR_INVALID_TAG

This tag is not valid.

NIFCONF_ERR_INVALID_VALUE

You have entered an incorrect value. Please check the value(s) and the valid ranges for the values.

NIFCONF_ERR_LOOP_IS_EMPTY

This loop does not contain any blocks.

NIFCONF_ERR_MACROCYCLE_CONFLICT

This macrocycle conflicts with a previously defined macrocycle time for a device in this loop. Devices can only schedule one macrocycle time. The best solution is to increase the macrocycle time of the loop that contains the other block(s) for this device.

NIFCONF_ERR_MACROCYCLE_NOT_GOOD_MULTIPLE

This macrocycle is a bad choice in comparison to the other macrocycles.

NIFCONF_ERR_MACROCYCLE_TOO_SHORT

There was not enough time in this macrocycle to schedule all the function blocks and parameters. Increase the macrocycle time of the loop to get more free time. A macrocyle generally must be at least 10 ms.

NIFCONF_ERR_MAXIMUM_LOOPS_EXCEEDED

The maximum number of loops you can configure on this link is exceeded.

NIFCONF_ERR_MISSING_NIFBUS_PATH

The install path for NI-FBUS Configurator is not in the Windows registry.

NIFCONF_ERR_MULTI_LAS

Multiple primary Link Active Schedulers are defined. Only one primary LAS is allowed on a link.

NIFCONF_ERR_MULTI_TM

Multiple time masters are defined. Only one time master per link is allowed.

NIFCONF_ERR_NO_CONVERSION

There is no conversion for this data type.

NIFCONF_ERR_NO_DATA

No data.

NIFCONF_ERR_NO_LAS_SELECTED

A schedule has been created but no LAS is selected.

NIFCONF_ERR_NO_LM_SELECTED

A schedule has been created but no link master is selected.

NIFCONF_ERR_NO_OBJECT_SELECTED

Nothing is selected.

NIFCONF_ERR_NO_PRINTER_DEVICE_CONTEXT

The NI-FBUS Configurator cannot draw the document because of an incorrect device context for the selected printer.

NIFCONF_ERR_NO_TM_SELECTED

No time master is selected.

NIFCONF_ERR_NO_UNSCHEDULED_TIME_LEFT

The auto scheduler ran out of unscheduled time. Increase the macrocycle time(s) to allow more free time for scheduling.

NIFCONF_ERR_NOT_ON_LINK

This object does not belong on this link.

NIFCONF_ERR_OD_SIZE_MISMATCH

The size of the actual data object does not match the object dictionary size.

NIFCONF_ERR_OUT_OF_MEMORY

Memory is low; the NI-FBUS Configurator cannot allocate objects. Close windows to solve this problem.

NIFCONF_ERR_PARAMETER_SCHEDULE_CONFLICT

A parameter communication has already been scheduled for this time. Do not schedule more than one parameter communication at a time on the Fieldbus.

NIFCONF_ERR_REGISTRY_ERROR

Some registry information for your application is missing or corrupt. You might need to reinstall the NI-FBUS software and the NI-FBUS Configurator. Refer to your getting started manual for installation instructions.

NIFCONF_ERR_STANDARD_DD_MISSING

The NI-FBUS Configurator could not find the standard device description file.

NIFCONF_ERR_STRING_NOT_FOUND

There is a missing resource string.

NIFCONF_ERR_TEMPLATE_NOT_ASSIGNED

The template is not assigned to a valid project object.

NIFCONF_ERR_TOO_MANY_FB_SCHEDULE_ENTRIES

The schedule for this object contains too many entries for the function block schedule of the device. Normally, bad choices for macrocycle times cause this error. Use macrocycle times that are integer multiples of each other to correct this problem.

NIFCONF_ERR_TOO_MANY_LAS_SCHEDULE_ENTRIES

The number of LAS schedule entries exceeds the number of available entries in the LAS device. Choose integer multiple macrocycle values and reduce the number of data links that go between devices to correct this problem.

NIFCONF_ERR_TYPE_INFO_UNAVAILABLE

The NI-FBUS Configurator cannot read the type information for the object.

NIFCONF_ERR_UNSCHEDULED_TRAFFIC_CONFLICT

The publish time is conflicting with the reserved 128 octet time at the end of a macrocycle. This time is used for unscheduled traffic.

NIFCONF_ERR_WRONG_TYPE

This object has the wrong type.

NIFCONF_ERR_SAVE_OLDVERSION

This project is an old version and could not be saved. To avoid this error, convert the project to the latest version when you open the project.

NIFCONF_ERR_FILENAME_EMPTY

Empty filename. Normally, this error occurs when you specify a file without the name.

NIFCONF_ERR_UNSUPPORT_HSE

This project you are opening includes an unsupported HSE feature.

NIFCONF_ERR_CANT_DELETE_ONLY_ONE_LINK

The last link in the project cannot be deleted. A valid project includes at least one link.

NIFCONF_ERR_WHEN_DISCONNECT_LINKS

The system is busy and the links cannot be disconnected. Try your operation at a later time.

NIFCONF_ERR_EMPTY_TAG

The Empty tag is not permitted, per the Foundation Fieldbus specification.

NIFCONF_ERR_SPACE_IN_TAG

The space character is not permitted in the middle of the tag, per the Foundation Fieldbus specification.

NIFCONF_ERR_OPERATION_CONFLICT

Operation conflict.

NIFCONF_ERR_UNEXPECTED

An unexpected error has occurred.

NIFCONF_ERR_NO_HOST_DEVICE

There is no host device in one or more H1 links.

NIFCONF_ERR_NO_MODE_SUPPORT

No run mode is supported currently.

NIFCONF_ERR_NO_RE_CONFIGURATION_SUPPORT

This version has no reconfiguration support.

NIFCONF_ERR_NO_BLOCK_MATCH

No block matches.

NIFCONF_ERR_NO_NP_MATCH

No network parameter matches.

NIFCONF_ERR_MAP_UNCOMPLETED

Device mapping is uncompleted.

NIFCONF_ERR_LINK_HAS_ACTIVE

The link to be online is active now; only one instance of a link can be active at a time.

E_INTERFACE_INVALID

This interface is invalid now.

E_UNDEFINED

The error is undefined.

E_OFFLINE_ERROR

Offline NI-FBUS error.

E_BLOCK_NOT_EXIST_IN_CFF

The block is undefined in the related `.cff` file.

E_MIB_PARAM_NAME_NOT_FOUND

The param name of MIB is not defined in the related `.cff` file.

E_OFF_DEVICE_NODE_INVALID

The offline device node is invalid.

E_CFF_NOT_FOUND

The corresponding `.cff` file is not found.

E_NULL_POINTER

A null pointer happens.

E_DEVICE_NOT_FOUND

The device you are looking for is not found.

E_OFFLINE_NOT_SUPPORTED

This feature is not currently supported in Offline mode.

E_REVISON_EQUAL

The revision should not be equal.

E_SET_ADDRESS_FAILED

Setting address operation failed.

Warnings

If you receive a warning while using the NI-FBUS Configurator, refer to this section for a description of the warning and possible solutions.

NIFCONF_WARN_MEMORY_LOW

The system is low on memory.

NIFCONF_WARN_OBJECT_NOT_WIRED

This object is not connected by wires to any other object.

NIFCONF_WARN_NO_TREND_SELECTED

A trend is wired, but no trend is checked.

NIFCONF_WARN_TREND_NOT_WIRED

A trend is selected, but not wired to a device.

NIFCONF_WARN_PROJECT_ERRORS

There are errors that might cause problems in the download of the configuration. Look at the **Errors** tab in the status window.

B

Technical Support and Professional Services

Visit the following sections of the National Instruments Web site at ni.com for technical support and professional services:

- **Support**—Online technical support resources include the following:
  - **Self-Help Resources**—For immediate answers and solutions, visit our extensive library of technical support resources available in English, Japanese, and Spanish at ni.com/support. These resources are available for most products at no cost to registered users and include software drivers and updates, a KnowledgeBase, product manuals, step-by-step troubleshooting wizards, conformity documentation, example code, tutorials and application notes, instrument drivers, discussion forums, a measurement glossary, and so on.
  - **Assisted Support Options**—Contact NI engineers and other measurement and automation professionals by visiting ni.com/support. Our online system helps you define your question and connects you to the experts by phone, discussion forum, or email.
- **Training**—Visit ni.com/training for self-paced tutorials, videos, and interactive CDs. You also can register for instructor-led, hands-on courses at locations around the world.
- **System Integration**—If you have time constraints, limited in-house technical resources, or other project challenges, NI Alliance Program members can help. To learn more, call your local NI office or visit ni.com/alliance.

If you searched ni.com and could not find the answers you need, contact your local office or NI corporate headquarters. Phone numbers for our worldwide offices are listed at the front of this manual. You also can visit the Worldwide Offices section of ni.com/niglobal to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

Glossary

Symbol	Prefix	Value
m	milli	10^{-3}

Numbers

4-20 mA system	Traditional control system in which a computer or control unit provides control for a network of devices controlled by 4-20 mA signals.

A

A	Amperes.
Actuator	A device that translates electrical signals into mechanical actions.
Acyclic communication	Unscheduled communication on the bus.
Address	Character code that identifies a specific location (or series of locations) in memory.
AI	Analog Input.
Alarm	A notification the NI-FBUS Communications Manager software sends when it detects that a block leaves or returns to a particular state.
Alarm condition	A notification that a Fieldbus device sends to another Fieldbus device or interface when it leaves or returns to a particular state.
Alert	An alarm or event.
Analog	A description of a continuously variable signal or a circuit or device designed to handle such signals.
AO	Analog Output.
API	*See* Application Programmer Interface.
Application Programmer Interface	A message format that an application uses to communicate with another entity that provides services to it.

Argument	A value you pass in a function call. Sometimes referred to as a parameter, but this documentation uses a different meaning for parameter, which is included in this glossary.
Array	Ordered, indexed list of data elements of the same type.
Attribute	Properties of parameters.

B

Bank	The combination of one FieldPoint network module and one or more terminal bases and I/O modules.
Basic device	A device that can communicate on the Fieldbus, but cannot become the LAS.
Block	A logical software unit that makes up one named copy of a block and the associated parameters its block type specifies. The values of the parameters persist from one invocation of the block to the next. It can be a resource block, transducer block, or function block residing within a virtual field device.
Block tag	A character string name that uniquely identifies a block on a Fieldbus network.
Boolean	Logical relational system having two values, each the opposite of the other, such as true and false or zero and one.
Buffer	Temporary storage for acquired or generated data.
Bus	The group of conductors that interconnect individual circuitry in a computer. Typically, a bus is the expansion vehicle to which I/O or other devices are connected. Examples of PC buses are the ISA and PCI buses.
Bus scheduler	*See* Link Active Scheduler.

C

C	Celsius.
Channel	A pin or wire lead to which you apply or from which you read the analog or digital signal.
Character string name	*See* Tag.
Configuration object	*See* Linkage.

Contained parameter	A parameter that does not receive or send data and is contained within a function block.
Control loop	A set of connections between blocks used to perform a control algorithm.
Control strategy	*See* Function Block Application.
Cyclic	Closed-loop control.

D

Data Link Layer	The second-lowest layer in the ISO seven-layer model (layer two). The Data Link Layer splits data into frames to send on the physical layer, receives acknowledgment frames, and re-transmits frames if they are not received correctly. It also performs error checking to maintain a sound virtual channel to the next layer.
Data link time synchronization	A time distribution message broadcast on the Fieldbus so that all devices have exactly the same data link time.
dB	Decibel.
DD	*See* Device Description.
Descriptor	A number returned to the application by the NI-FBUS Communications Manager, used to specify a target for future NI-FBUS calls.
Device	A sensor, actuator, or control equipment attached to the Fieldbus.
Device address	A memory address that you use to access a device in a computer system.
Device Description	A machine-readable description of all the blocks and block parameters of a device.
Device Description Service	A set of functions that applications use to access Device Descriptions.
Device ID	An identifier for a device that the manufacturer assigns. No two devices can have the same device ID.
Device tag	A name you assign to a Fieldbus device.
DI	Discrete Input.
Distributed control	Process control distributed among several devices connected by network.

DLL	*See* Dynamic Link Library.
DO	Discrete Output.
Dynamic Link Library	A library of functions and subroutines that links to an application at run time.

E

Event	An occurrence on a device that causes a Fieldbus entity to send the Fieldbus event message.

F

FAS	Fieldbus Access Sublayer.
FB	Function Block.
FBAP	*See* Function Block Application.
FF	Foundation Fieldbus.
Field device	A Fieldbus device connected directly to a Fieldbus.
Fieldbus	An all-digital, two-way communication system that connects control systems to instrumentation. A process control local area network defined by ISA standard S50.02.
Fieldbus Foundation	An organization that developed a Fieldbus network specifically based upon the work and principles of the ISA/IEC standards committees.
Foundation Fieldbus specification	The communications network specification that the Fieldbus Foundation created.
FP-3000	National Instruments network interface module for the FieldPoint I/O system.
FTP	File Transfer Protocol.
Function block	A named block consisting of one or more input, output, and contained parameters. The block performs some control function as its algorithm. Function blocks are the core components you control a system with. The Fieldbus Foundation defines standard sets of function blocks. There are ten function blocks for the most basic control and I/O functions. Manufacturers can define their own function blocks.
Function Block Application	The block diagram that represents your control strategy.

Function Block Application Editor window	The middle window of the NI-FBUS Configurator where you create your block diagram.
Function block execution schedule	A list of times in the macrocycle when the function block will begin to execute its algorithm.

H

H1	The 31.25 kbit/s type of Fieldbus.
hex	Hexadecimal. A base-16 numbering system which uses 0–9 and A–F.
HMI	Human-Machine Interface. A graphical user interface for the process with supervisory control and data acquisition capability.
Host device	A computer or controller on a Fieldbus network.
HSE	High Speed Ethernet.

I

I/O	Input/output.
Index	An integer that the Fieldbus specification assigns to a Fieldbus object or a device that you can use to refer to the object. A value in the object dictionary used to refer to a single object.
Input parameter	A block parameter that receives data from another block.
IRQ	Interrupt request.
ISO	International Organization for Standardization. A technical standards organization that creates international technical standards for computers and communications. The ISO is composed of national standards organizations in 89 countries. The American National Standards Institute (ANSI) represents the United States in the ISO.
Isolation	A type of signal conditioning in which you isolate the transducer signals from the computer for safety purposes. This protects you and your computer from large voltage spikes and makes sure the measurements from the devices are not affected by differences in ground potentials.

L

LAS	*See* Link Active Scheduler.
Link	A Foundation Fieldbus network is made up of devices connected by a serial bus. This serial bus is called a link (also known as a segment).
Link Active Schedule	A schedule of times in the macrocycle when devices must publish their output values on the Fieldbus.
Link Active Scheduler	The Fieldbus device that is currently controlling access to the Fieldbus. A device that is responsible for keeping a link operational. The LAS executes the link schedule, circulates tokens, distributes time, and probes for new devices.
Link master device	A device that is capable of becoming the LAS.
Linkage	A connection between function blocks.
Linkage object	An object resident in a device that defines connections between function block input and output across the network. Linkage objects also specify trending connections.
LM	Link Master.
Lookout	National Instruments Lookout is a full-featured object-based automation software system that delivers unparalleled power and ease of use in demanding industrial measurement and automation applications.
Loop	*See* Control loop.

M

Macrocycle	The least common multiple of all the loop times on a given link, or one iteration of a the process control loop.
Manufacturer's identification	An identifier used to correlate the device type and revision with its device description and device description revision.
Menu	An area accessible from the command bar that displays a subset of the possible command choices. In the NI-FBUS Configurator, refers to menus defined by the manufacturer for a given block.
Method	Methods describe operating procedures to guide a user through a sequence of actions.
Mode	Type of communication.

N

NI-FBUS API	The NI-FBUS Communications Manager.
NI-FBUS Communications Manager	Software shipped with National Instruments Fieldbus interfaces that lets you read and write values. It does not include configuration capabilities.
NI-FBUS Configurator	National Instruments Fieldbus configuration software. With it, you can set device addresses, clear devices, change modes, and read and write to the devices.
NI-FBUS Fieldbus Configuration System	*See* NI-FBUS Configurator.
NI-FBUS process	Process that must be running in the background for you to use your AT-FBUS or PCMCIA-FBUS interface to communicate between the board and the Fieldbus.
Nifb.exe	The NIFB process that must be running in the background for you to use your AT-FBUS or PCMCIA-FBUS interface to communicate between the board and the Fieldbus.
Non-volatile memory	Memory that does not require electricity to hold data.

O

Object	An element of an object dictionary.
Object description	Describes data that is communicated over the Fieldbus.
Object Dictionary	A structure in a device that describes data that can be communicated on the Fieldbus. The object dictionary is a lookup table that gives information such as data type and units about a value that can be read from or written to a device.
Octet	A single 8-bit value.
OD	*See* Object Dictionary.
Offline	Not connected to or installed in the computer.
OOS	Out of Service mode.
OPC	OLE for Process Control.
Output parameter	A block parameter that sends data to another block.

P

Parameter	One of a set of network-visible values that makes up a function block.
PC	Personal Computer.
PCMCIA	Personal Computer Memory Card International Association.
PD	Proportional Derivative.
PDU	Protocol Data Unit.
PID	Proportional/Integral/Derivative. A common control function block algorithm that uses proportions, integrals, and derivatives in calculation.
PLC	*See* Programmable Logic Controller.
PN	Probe Node.
Poll	To repeatedly inspect a variable or function block to acquire data.
Port	A communications connection on a computer or remote controller.
Process variable	A common Fieldbus function block parameter representing some value in the process being controlled.
Programmable Logic Controller	A device with multiple inputs and outputs that contains a program you can alter.
PT	Pass Token.
Publisher	A device that has at least one function block with its output value connected to the input of another device.
Publishing schedule	Determines when data members are published over the Fieldbus.
PV	Process Variable.

R

RA	Ratio.
Resource block	A special block containing parameters that describe the operation of the device and general characteristics of a device, such as manufacturer and device name. Only one resource block per device is allowed.

S

s	Seconds.
Sample type	Specifies how trends are sampled on a device, whether by averaging data or by instantaneous sampling.
Scheduled/cyclic communications	Communication that occurs at the same time during each control cycle.
Segment	*See* Link.
Sensor	A device that responds to a physical stimulus (heat, light, sound, pressure, motion, flow, and so on), and produces a corresponding electrical signal.
Server	Device that receives a message request.
Service	Services allow user applications to send messages to each other across the Fieldbus using a standard set of message formats.
Session	A communication path between an application and the NI-FBUS Communications Manager.
Stack	A set of hardware registers or a reserved amount of memory used for calculations or to keep track of internal operations.
Stale	Data that has not been updated for `stale_limit` number of macrocycles, where the stale limit is a parameter of the connection.
Subscriber	A device that has at least one function block with its input value connected to the output of another device.
Symbol file	A Fieldbus Foundation or device manufacturer-supplied file that contains the ASCII names for all the objects in a device.

T

Tag	A name you can define for a block, virtual field device, or device.
Timeout	A period of time after which an error condition is raised if some event has not occurred.
Traditional system	*See* 4-20 mA system.

Transducer block	A block that is an interface to the physical, sensing hardware in the device. It also performs the digitizing, filtering, and scaling conversions needed to present input data to function blocks, and converts output data from function blocks. Transducer blocks decouple the function blocks from the hardware details of a given device, allowing generic indication of function block input and output. Manufacturers can define their own transducer blocks.
Trend	A Fieldbus object that allows a device to sample a process variable periodically, then transmit a history of the values on the network.
Trend function	An NI-FBUS call related to trends.

U

Unscheduled	Messages sent on the Fieldbus between transmissions of scheduled messages.
Upstream	Fewer network hops away from a backbone or hub. For example, a small ISP that connects to the Internet through a larger ISP that has their own connection to the backbone is downstream from the larger ISP, and the larger ISP is upstream from the smaller ISP.

V

VFD	*See* Virtual Field Device.
View objects	Predefined groupings of parameter sets that HMI applications use.
Virtual Field Device	The virtual field device is a model for remotely viewing data described in the object dictionary. The services provided by the Fieldbus Messaging Specification allow you to read and write information about the object dictionary, read and write the data variables described in the object dictionary, and perform other activities such as uploading/downloading data and invoking programs inside a device. A model for remotely viewing data described in the object dictionary.

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