ProSoft® TECHNOLOGY

Where Automation Connects.

ProLinx®

DFNT

ProLinx Gateway

EtherNet/IP Explicit Messaging Client/Server

May 30, 2012

PROTOCOL MANUAL

Your Feedback Please

We always want you to feel that you made the right decision to use our products. If you have suggestions, comments, compliments or complaints about our products, documentation, or support, please write or call us.

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DFNT Protocol Manual

May 30, 2012

ProSoft Technology® Product Documentation

In an effort to conserve paper, ProSoft Technology no longer includes printed manuals with our product shipments. User Manuals, Datasheets, Sample Ladder Files, and Configuration Files are provided on the enclosed CD-ROM, and are available at no charge from our web site: www.prosoft-technology.com

Important Installation Instructions

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

A WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2;
B WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES
C WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
D THIS DEVICE SHALL BE POWERED BY CLASS 2 OUTPUTS ONLY.

ProLinx® Products Warnings

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT – RISQUE D'EXPLOSION – AVANT DE DÉCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

ProLinx Gateways with Ethernet Ports

Series C ProLinx™ Gateways with Ethernet ports do **NOT** include the HTML Web Server. The HTML Web Server must be ordered as an option. This option requires a factory-installed hardware addition. The HTML Web Server now supports:

- 8 MB file storage for HTML files and associated graphics files (previously limited to 384K)
- 32K maximum HTML page size (previously limited to 16K)

To upgrade a previously purchased Series C model:

Contact your ProSoft Technology distributor to order the upgrade and obtain a Returned Merchandise Authorization (RMA) to return the unit to ProSoft Technology.

Contents

1 Start Here

In This Chapter

1.1 System Requirements

The ProSoft Configuration Builder configuration software for the DFNT module requires the following minimum hardware and software components:

- Pentium® II 450 MHz minimum. Pentium III 733 MHz (or better) recommended
- Supported operating systems:
  - Microsoft Windows Vista
  - Microsoft Windows XP Professional with Service Pack 1 or 2
  - Microsoft Windows 2000 Professional with Service Pack 1, 2, or 3
  - Microsoft Windows Server 2003
- 128 Mbytes of RAM minimum, 256 Mbytes of RAM recommended
- 100 Mbytes of free hard disk space (or more based on application requirements)
- 256-color VGA graphics adapter, 800 x 600 minimum resolution (True Color 1024 × 768 recommended)
- CD-ROM drive

1.2 Package Contents

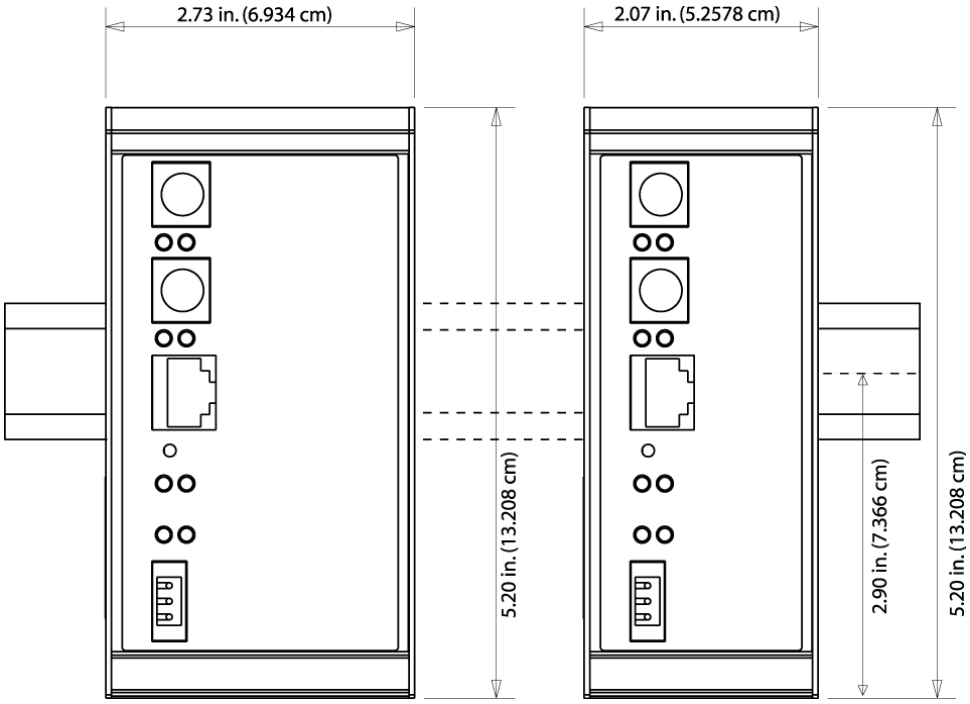
The following components are included with your DFNT module, and are all required for installation and configuration.

Important: Before beginning the installation, please verify that all of the following items are present.

Qty.	Part Name	Part Number	Part Description
1	DFNT module	PLX-####	ProLinx communication gateway
1	Cable	Cable #15, RS232 Null Modem	For RS232 Connection from a PC to the CFG Port of the module
Varies	Cable	Cable #9, Mini-DIN8 to DB9 Male Adapter	For DB9 Connection to module's Port. One DIN to DB-9M cable included per configurable serial port, plus one for module configuration
Varies	Adapter	1454-9F	Adapters, DB9 Female to Screw Terminal. For RS422 or RS485 Connections to each serial application port of the module
1	ProSoft Solutions CD		Contains sample programs, utilities and documentation for the DFNT module.

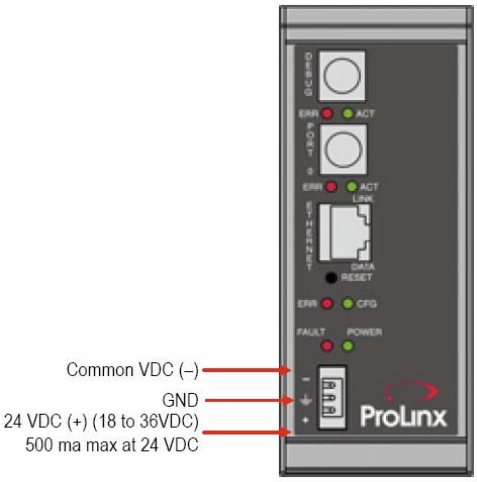
If any of these components are missing, please contact ProSoft Technology Support for replacements.

1.3 Mounting the Module on the DIN-rail



ProLinx 5000/6000 Series module

1.4 Connecting Power to the Unit



WARNING: Ensure that you do not reverse polarity when applying power to the module. This will cause damage to the module's power supply.

1.5 Installing ProSoft Configuration Builder Software

You must install the *ProSoft Configuration Builder (PCB)* software to configure the module. You can always get the newest version of *ProSoft Configuration Builder* from the ProSoft Technology website.

Installing ProSoft Configuration Builder from the ProSoft website

1. Open your web browser and navigate to *http://www.prosoft-technology.com/pcb*
2. Click the **DOWNLOAD HERE** link to download the latest version of *ProSoft Configuration Builder*.
3. Choose **SAVE** or **SAVE FILE** when prompted.
4. Save the file to your *Windows Desktop*, so that you can find it easily when you have finished downloading.
5. When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

If you do not have access to the Internet, you can install *ProSoft Configuration Builder* from the *ProSoft Solutions Product CD-ROM*, included in the package with your module.

Installing ProSoft Configuration Builder from the Product CD-ROM

1. Insert the *ProSoft Solutions Product CD-ROM* into the CD-ROM drive of your PC. Wait for the startup screen to appear.
2. On the startup screen, click **PRODUCT DOCUMENTATION**. This action opens a *Windows Explorer* file tree window.
3. Click to open the **UTILITIES** folder. This folder contains all of the applications and files you will need to set up and configure your module.
4. Double-click the **SETUP CONFIGURATION TOOL** folder, double-click the **PCB_*.EXE** file and follow the instructions on your screen to install the software on your PC. The information represented by the "*****" character in the file name is the *PCB* version number and, therefore, subject to change as new versions of *PCB* are released.

Note: Many of the configuration and maintenance procedures use files and other utilities on the CD-ROM. You may wish to copy the files from the Utilities folder on the CD-ROM to a convenient location on your hard drive.

1.5.1 Using the Online Help

Most of the information needed to help you use ProSoft Configuration Builder is provided in a Help System that is always available whenever you are running ProSoft Configuration Builder. The Help System does not require an Internet connection.

To view the help pages, start ProSoft Configuration Builder, open the **HELP** menu, and then choose **CONTENTS.**

2 Functional Overview

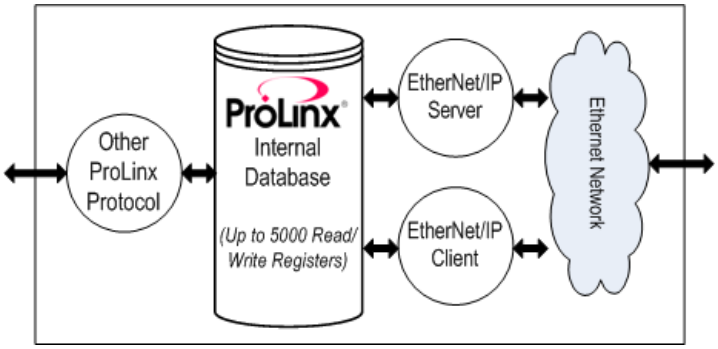
In This Chapter

The ProLinx EtherNet/IP (DFNT) driver can be used to interface many different protocols into the Rockwell Automation family of processors as well as other software-based solutions. The DFNT driver supports Client connections as well as Server connections. With the addition of the WEB hardware option, the module also provides HTTP, FTP and Email capability.

The Ethernet driver interfaces with a common internal database in the module. This permits the sharing of data across many different networks. Rockwell Automation processors supported on the TCP/IP network include ControlLogix, PLC5 Ethernet and SLC 5/05.

The module also supports unconnected client through the UClient section. Unconnected messaging is a type of Ethernet/IP explicit message that uses TCP/IP implementation. Certain devices, such as the AB Power Monitor 3000 series B, support unconnected messaging. Check your device documentation for further information about its Ethernet/IP implementation.

The following illustration shows the functionality of the DFNT driver.



2.1 EtherNet/IP (Explicit Messaging) Compatible Devices

List of Rockwell Automation material that support EPIC:

- PLC5/E rev C/N, D/E, E/D
- SLC5/05 series A, OS503 frn4
- 1785-ENET Series A, rev D
- Interchange V6.2
- MicroLogix 1100/1400/ANY via 1761-NET-ENI
- CompactLogix 1768-L43/L45 via 1768-ENBT
- CompactLogix 1769-L32E/L35E/ANY via 1761-NET-ENI
- CompactLogix L23E
- RSLinx Gateway V1.7+
- ControlLogix 1756-ENET/ENBT/EN2T

2.2 EtherNet/IP (DFNT) Port

The module supports two independent clients on the TCP/IP network to interface with processors using a user constructed command list of up to 100 entries for each client. The use of two clients permits the module to have a high priority (small number of commands) and low priority (larger number of commands) simultaneously. The module's internal database is used as the source for write commands to the remote processors. Data collected from the processors using read commands is placed in the module's database.

2.2.1 ProLinx DFNT Client Counts

The following table lists the number and type of DFNT Clients and Servers available on ProLinx gateways based on the companion protocol installed on the gateway.

ProLinx Model Number / Part Number	Number of Connected DFNT Clients (TCP/IP)	Number of Unconnected DFNT Clients (UDP)	Number of Connected DFNT Servers (TCP/IP)
5201-DFNT-101M	2	1	5
5201-DFNT-101S	2	1	5
5201-DFNT-103M	1	1	5
5201-DFNT-104S	2	1	5
5201-DFNT-ASCII	2	1	10
5201-DFNT-BACNET	2	1	5
5201-DFNT-BSCH	2	0	5
5201-DFNT-CLVM	2	0	5
5201-DFNT-DFCM	2	1	10
5201-DFNT-DH485	2	1	5
5201-DFNT-DNPM	1	1	5
5201-DFNT-DNPS	2	1	5
5201-DFNT-DNPSNET	2	1	5
5201-DFNT-EGD	1	1	5
5201-DFNT-GRCM	2	0	5
5201-DFNT-ISDA	2	0	5
5201-DFNT-MCM	2	1	5
5201-DFNT-PNPM	2	0	5
5201-MNETC-DFNT	1	1	5
5201-MNET-DFNT	1	1	5
5202-DFNT-ASCII4	2	1	10
5202-DFNT-BSCH4	2	0	5
5202-DFNT-CLVM4	2	0	5
5202-DFNT-DFCM4	1	1	5
5202-DFNT-GRCM4	2	0	5
5202-DFNT-ISDA4	2	0	5
5202-DFNT-MCM4	2	1	5
5202-DFNT-PNPM4	2	0	5
5204-DFNT-PDPM	5	1	5
5204-DFNT-PDPMV1	2	1	5
5205-DFNT-PDPS	5	1	5
5206-DFNT-DEM	5	1	5
5207-DFNT-HART	4	1	5
5208-DFNT-HART	4	1	5
5209-DFNT-CCLINK	2	1	5
5210-DFNT-RIO	5	1	5
5228-DFNT-HART(2)	4	1	5
5303-MBP-DFNT	2	1	5

2.2.2 Module Internal Database

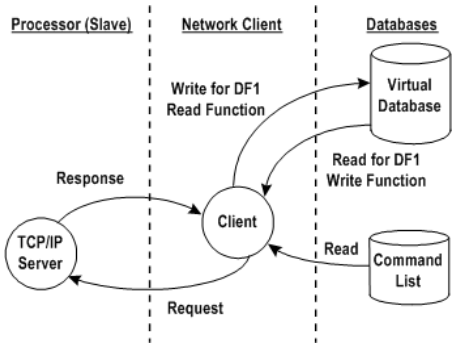
The internal database is central to the functionality of the module. This database is shared between all the ports on the module and is used as a conduit to pass information from one device on one network to one or more devices on either connected network. This permits data from devices on one communication port or network to be viewed and controlled by devices on another port or network.

In addition to data from the Master and <SlaveServer> ports, status and error information generated by the module can also be mapped into the internal database.

2.2.3 DFNT EtherNet/IP Client Access to Database

The client functionality places data from the DFNT module automatically in data tables established in ControlLogix, PLC5 and SLC 5/05 processors. The command list defined in the user configuration defines what data is to be transferred between the module and one of the processors. No ladder logic is required in the processor for client functionality.

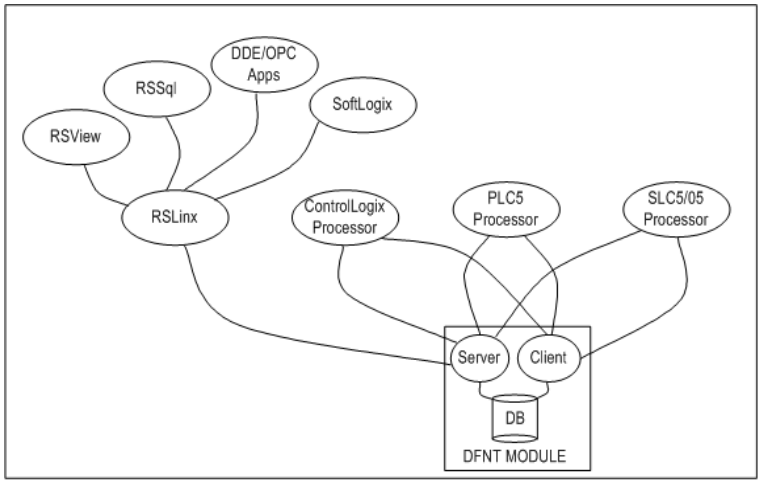
The following diagram describes the flow of data between the Ethernet clients and the internal database.



2.3 DFNT Server Access to Database

The DFNT module supports server functionality using the reserved ControlNet service port 0xAF12. Services supported in the module permit client applications (that is, RSView, ControlLogix processors and RSLinx) to read from and write to the module's database. This document discusses the requirements for attaching to the module using several client applications.

The following illustration shows the relationship of the DFNT module's functionality to devices on an Ethernet network:



Server functionality places all data transfer operations outside the module. There is no configuration required in the module other than setting up the network and database parameters in the configuration file. Ladder logic in attached processors use MSG instructions to perform read and write operations on the module's internal database.

When RSLinx links a user application to the module, the module's server functionality must be used. RSLinx exists on an Ethernet network only as a client application. It cannot act as a server. User applications can use the DDE/OPC capabilities built into RSLinx to interface with the data in the DFNT module. RSView can link directly to the module using drivers supplied by RSLinx.

The internal database of the DFNT module is used as the source (read requests) and destination (write requests) for requests from remote clients. Access to the database depends on the MSG command type executed to interface with the database. The following table defines the relationship of the module's internal database to the addresses required in the MSG instructions:

MSG Instruction Type

Database Address	PLC2	PLC5 or SLC	ControlLogix	
			PCCC	CIP Integer
0	0	N10:0	N10:0	Int_data[0]
999	999	N19:99	N19:99	Int_data[999]
1000	1000	N20:0	N20:0	Int_data[1000]
1999	1999	N29:99	N29:99	Int_data[1999]
2000	2000	N30:0	N30:0	Int_data[2000]
2999	2999	N39:99	N39:99	Int_data[2999]
3000	3000	N40:0	N40:0	Int_data[3000]
3999	4000	N49:99	N49:99	Int_data[3999]

MSG Instruction Type

Database Address	CIP Boolean	ControlLogix			
		CIP Bit Array	CIP Byte	CIP Double Int	CIP Real
0	BoolData[0]	BitAData[0]	SIntData[0]	DIntData[0]	RealData[0]
999	BoolData[15984]		SIntData[1998]		
1000	BoolData[16000]	BitAData[500]	SIntData[2000]	DIntData[500]	RealData[500]
1999	BoolData[31984]		SIntData[3998]		
2000	BoolData[32000]	BitAData[1000]	SIntData[4000]	DIntData[1000]	RealData[1000]
2999	BoolData[47984]		SIntData[5998]		
3000	BoolData[48000]	BitAData[1500]	SIntData[6000]	DIntData[1500]	RealData[1500]
3999	BoolData[63999]		SIntData[9998]		

When using PLC5 or SLC commands, access to the database is through simulated "N" files. For example, to access database element 3012, use the file address of N40:12. When using CIP Data Table Read or Write commands, use the various data[ ] tag arrays described in the following table. For example, use int_data[3012] to access database register 3012 as an integer value.

Data Type	Tag Name	Length of Each Element in CIP message	Array Range for 4000 Element Database
BOOL	BOOLData[ ]	1	0 to 63999
Bit Array	BITAData[ ]	4	0 to 1999
SINT	SINTData[ ]	1	0 to 7999
INT	INT_Data[ ]	2	0 to 3999
DINT	DINTData[ ]	4	0 to 1999
REAL	REALData[ ]	4	0 to 1999

Before attempting to use the module on a network, verify that the DFNT module is correctly configured and connected to the network. A network program such as PING can be utilized to make certain the module can be seen on the network. Use ProSoft Configuration Builder to verify correct operation, and to transfer configuration files to and from the module.

2.3.1 EtherNet/IP Explicit Messaging Server Command Support

The current version of the module will respond to the following list of commands. Future releases may support more functions as required by user applications.

2.3.2 Basic Command Set Functions

Command	Function	Definition	Supported in Server
0x00	N/A	Protected Write	X
0x01	N/A	Unprotected Read	X
0x02	N/A	Protected Bit Write	X
0x05	N/A	Unprotected Bit Write	X
0x08	N/A	Unprotected Write	X

2.3.3 PLC-5 Command Set Functions

Command	Function	Definition	Supported in Server
0x0F	0x00	Word Range Write (Binary Address)	X
0x0F	0x01	Word Range Read (Binary Address)	X
0x0F		Typed Range Read (Binary Address)	X
0x0F		Typed Range Write (Binary Address)	X
0x0F	0x26	Read-Modify-Write (Binary Address)	
0x0F	0x00	Word Range Write (ASCII Address)	X
0x0F	0x01	Word Range Read (ASCII Address)	X
0x0F	0x26	Read-Modify-Write (ASCII Address)	

2.3.4 SLC-500 Command Set Functions

Command	Function	Definition	Supported in Server
0x0F	0xA1	Protected Typed Logical Read With Two Address Fields	X
0x0F	0xA2	Protected Typed Logical Read With Three Address Fields	X
0x0F	0xA9	Protected Typed Logical Write With Two Address Fields	X
0x0F	0xAA	Protected Typed Logical Write With Three Address Fields	X
0x0F	0xAB	Protected Typed Logical Write With Mask (Three Address Fields)	

2.4 Other Ethernet Services (HTTP/FTP)

Other network services are provided on the module, if the WEB option is installed.

Important: The WEB option is an additional hardware component that is installed on the module during manufacturing. If the WEB option is not installed, the following features are not enabled.

The module contains an HTTP server to serve Web pages containing database data and error/status values present in the module's internal database to a Web browser. The pages presented can be those built into the module or custom designed by the user. Additionally, Web pages can be constructed to alter (write) the values contained in the module's database.

An FTP server is present to handle file operations controlled from a remote computer on the network.

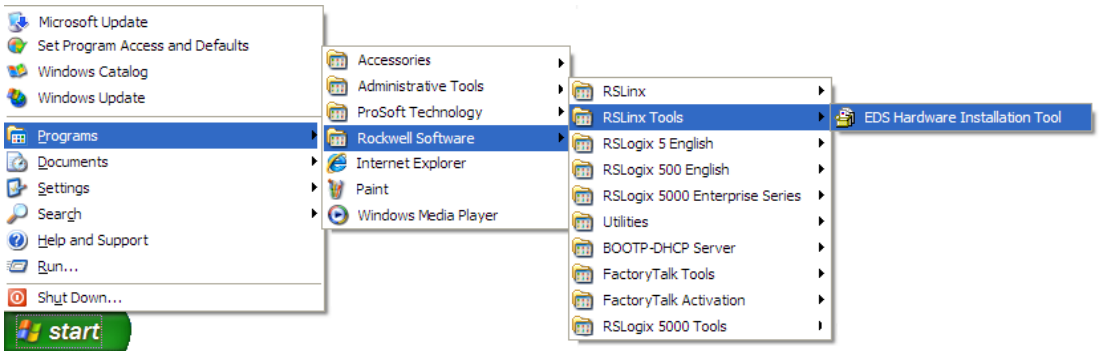
The following table describes the capabilities of the WEB option.

Type	Specifications
HTML Server (See note below)	Key features of the HTML server include: ▪ Max HTML page size: 1MB ▪ Max File Storage: 32MB ▪ Supported context types: jpeg, bmp, css ▪ Supported data types: bit, ASCII, integer, float ▪ Sockets: Up to ten connections. Note that this limits the number of simultaneous graphic file and frame references per HTML page
FTP Server	Permits remote HTML file transfer between the module and remote host. Capabilities of the FTP Server include: ▪ Single socket connection ▪ Non-passive transfers only ▪ WS_FTP or Command Line FTP recommended CuteFTP, Internet Explorer, Netscape, or NCFTP all support multiple socket connections and therefore will not support the ProLinx module

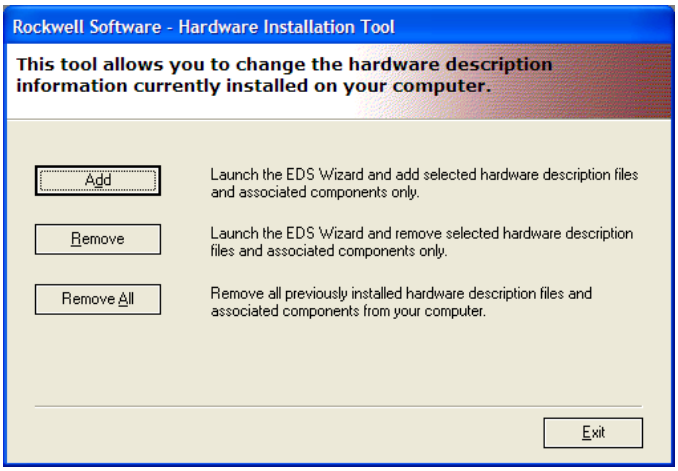
For detailed information on these services, refer to the WEB Driver Manual.

2.5 Installing the .EDS file with RSLinx

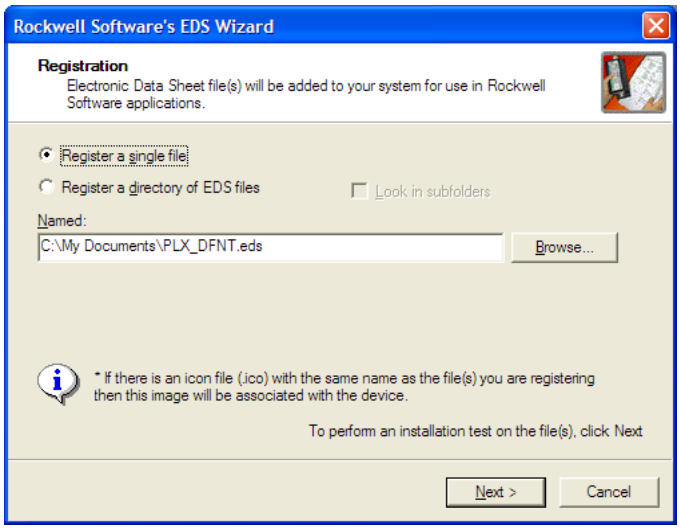
1 Click on RSLinx Tools / EDS Hardware Installation Tool



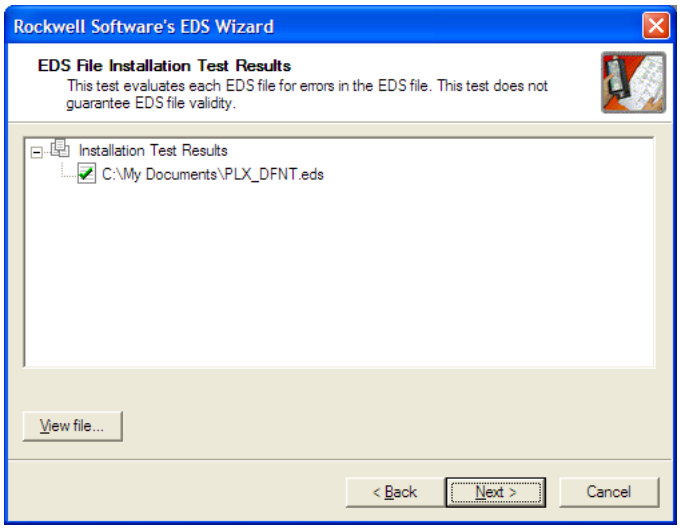
2 Click on the Add button.



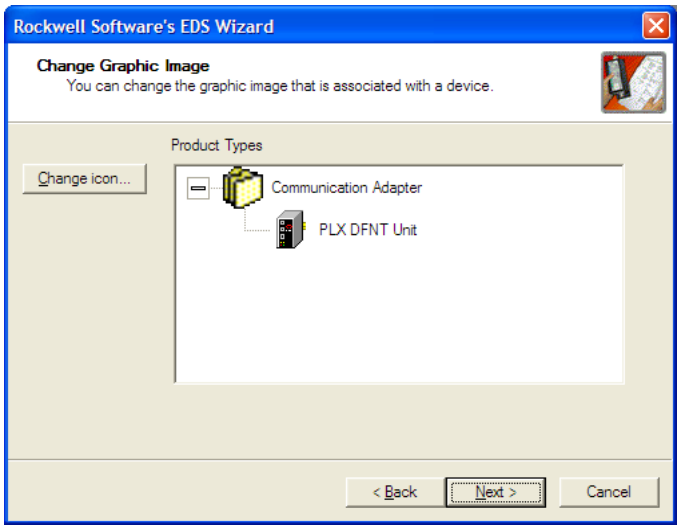
3 Select Single File and Browse the .EDS file in your computer. Make sure that the same folder contains the .ICO file (ProLinx ICON). Click on the Next button.



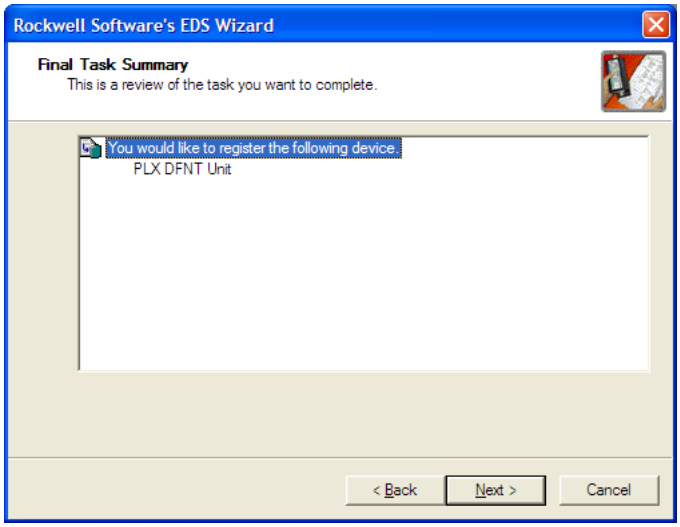
4 Select the file once it was evaluated for errors and click the Next button.



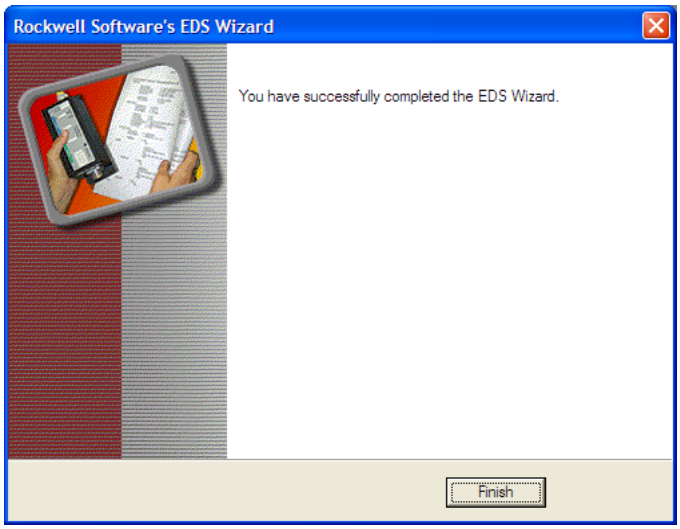
5 This window displays how the module will be displayed. Click on the Next button



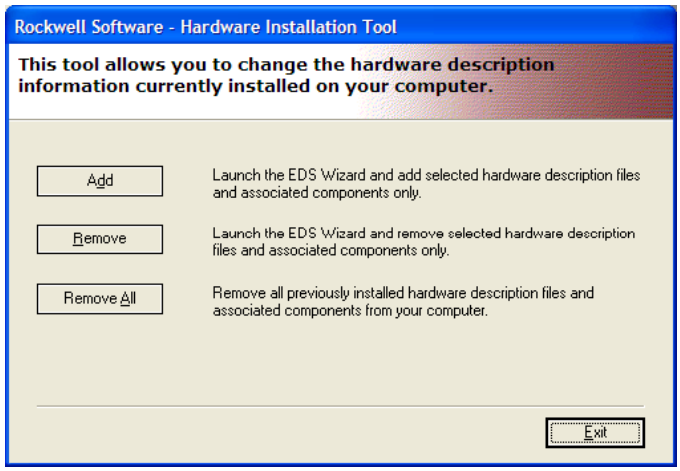
6 The following window allows the user to review the configuration.



7 The procedure is concluded. Click the Finish button.

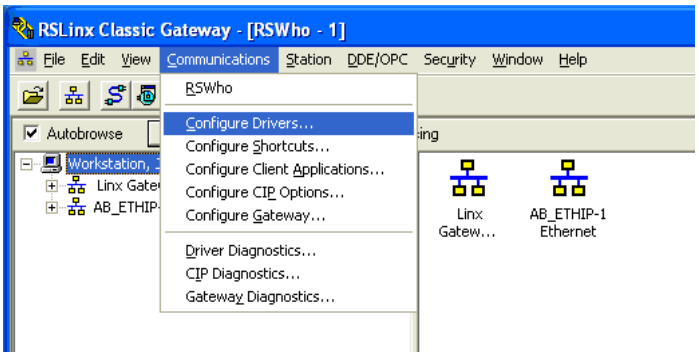


8 Click the Exit button to quit the Hardware Installation Tool.

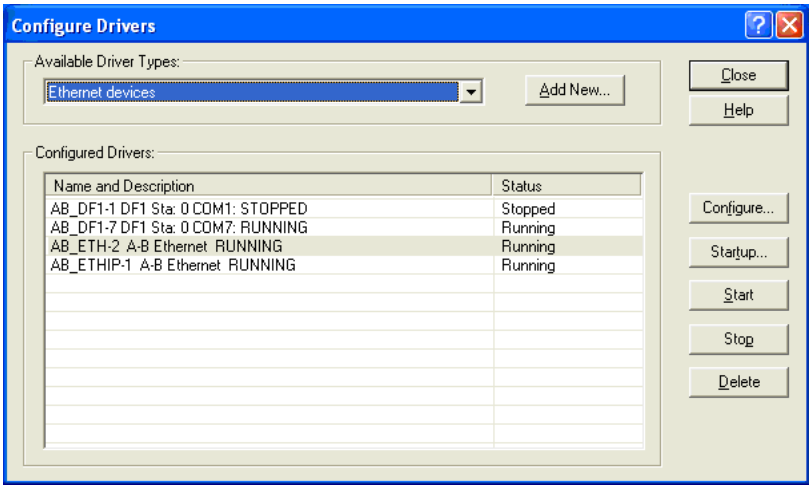


2.6 Browsing the module using RSLinx

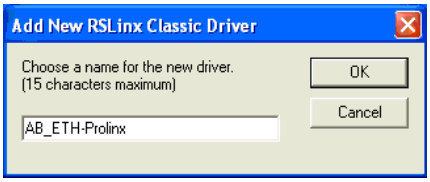
1 With RSLinx running, click on **COMMUNICATIONS/CONFIGURE DRIVERS**.



2 Select **ETHERNET DEVICES**.

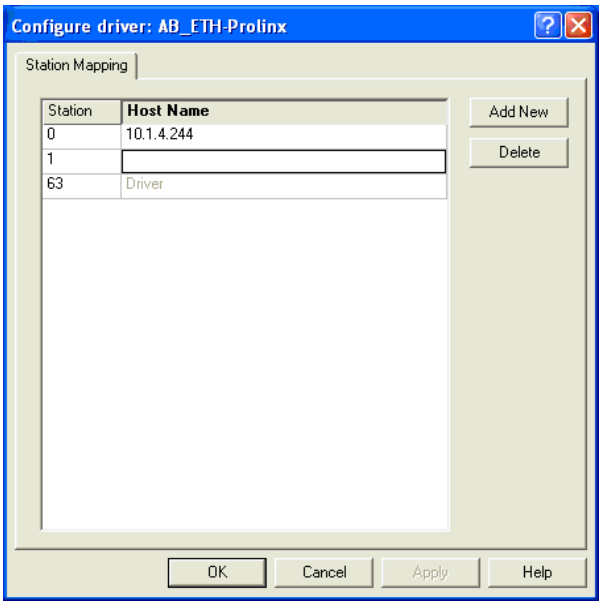


3 Enter a name for the RSLinx Driver, "AB_ETH-PROLINX", for example.

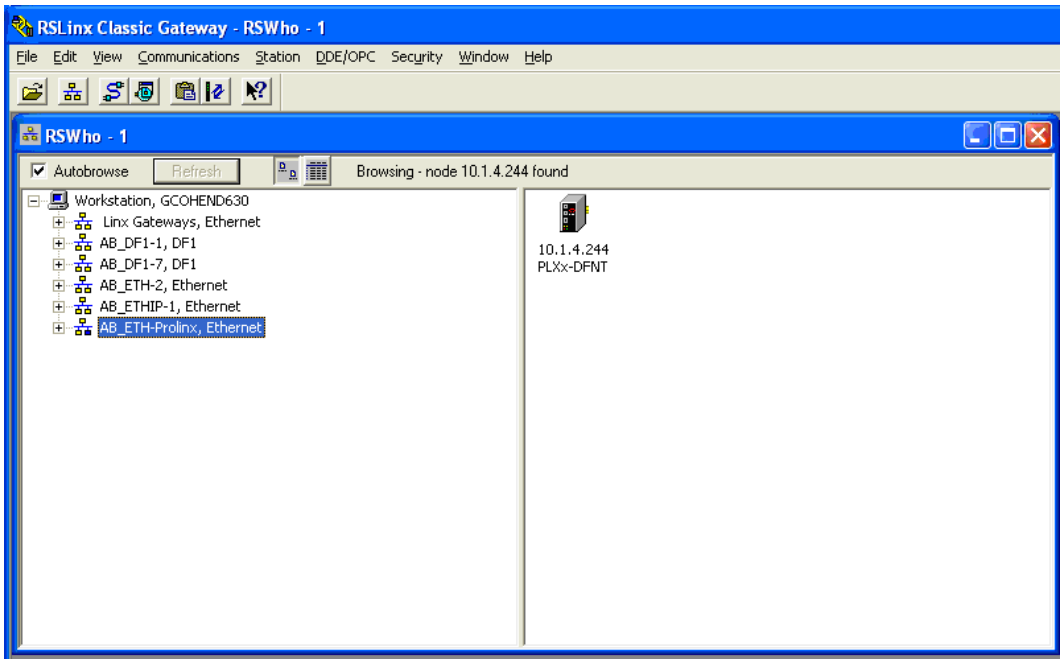


4 Configure the IP address for the module.

5 Configure the IP addresses for any other EtherNet/IP devices on the network.



6 Click on **COMMUNICATIONS/RSWHO** to browse the network and display the module's icon.



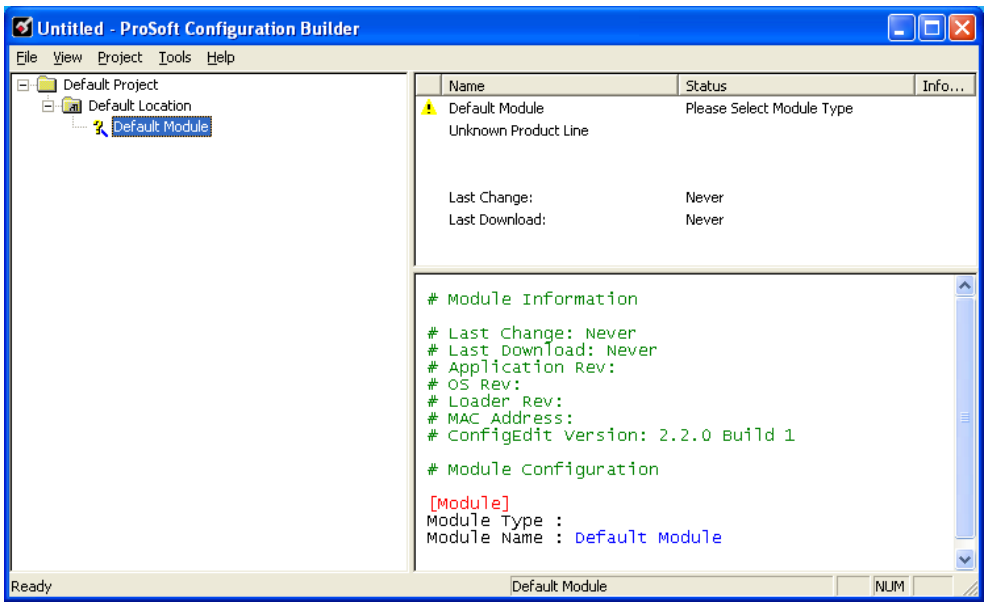
3 Configuring the Gateway

3.1 Using ProSoft Configuration Builder

ProSoft Configuration Builder (PCB) provides a quick and easy way to manage module configuration files customized to meet your application needs. *PCB* is not only a powerful solution for new configuration files, but also allows you to import information from previously installed (known working) configurations to new projects.

3.1.1 Setting Up the Project

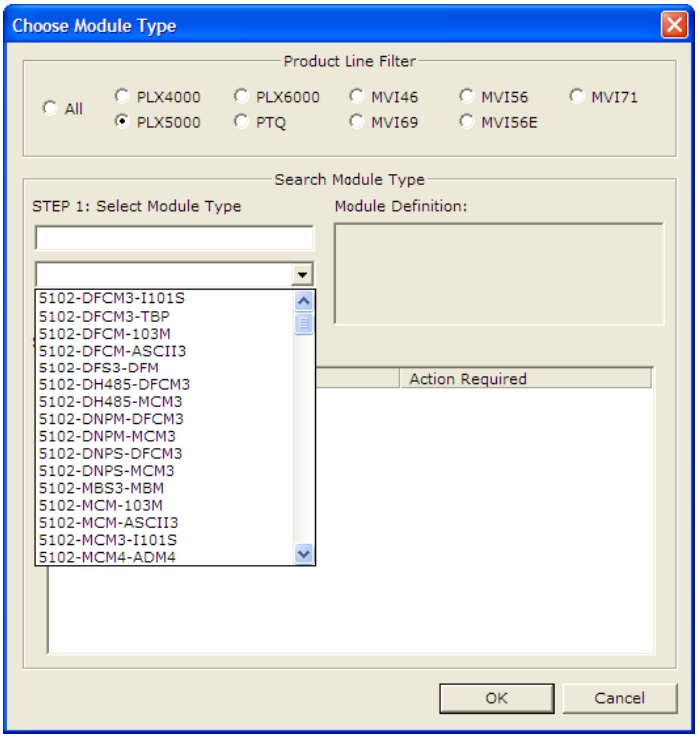
To begin, start ProSoft Configuration Builder (PCB). If you have used other Windows configuration tools before, you will find the screen layout familiar. ProSoft Configuration Builder's (PCB's) window consists of a tree view on the left, an information pane, and a configuration pane on the right side of the window. When you first start PCB, the tree view consists of folders for Default Project and Default Location, with a Default Module in the Default Location folder. The following illustration shows the PCB window with a new project.



To add the module to the project

1 Use the mouse to select **DEFAULT MODULE** in the tree view, and then click the right mouse button to open a shortcut menu.

2 On the shortcut menu, choose **CHOOSE MODULE TYPE**. This action opens the *Choose Module Type* dialog box.

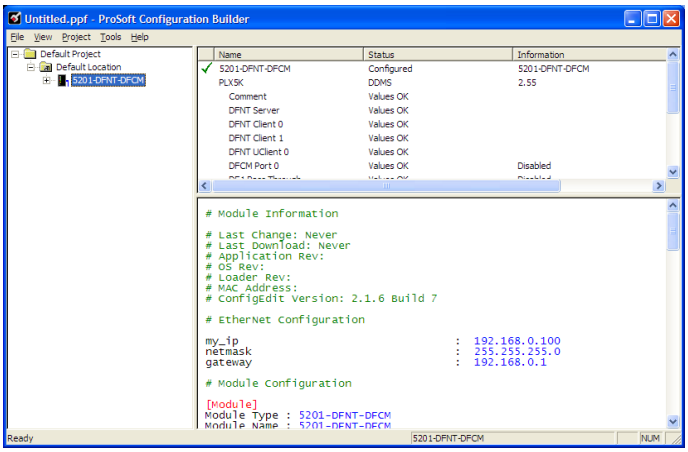


3 In the *Product Line Filter* area of the dialog box, select the appropriate product type radio button.

4 In the *STEP 1: Select Module Type* dropdown list, select the model number that matches your module, and then click **OK** to save your settings and return to the *PCB Main* window.

3.1.2 Renaming PCB Objects

Notice that the contents of the information pane and the configuration pane changed when you added the module to the project.



At this time, you may wish to rename the *Default Project* and *Default Location* folders in the tree view.

1. Select the object, and then click the right mouse button to open a shortcut menu. From the shortcut menu, choose **RENAME.**
2. Type the name to assign to the object.
3. Click *away* from the object to save the new name.

Configuring Module Parameters

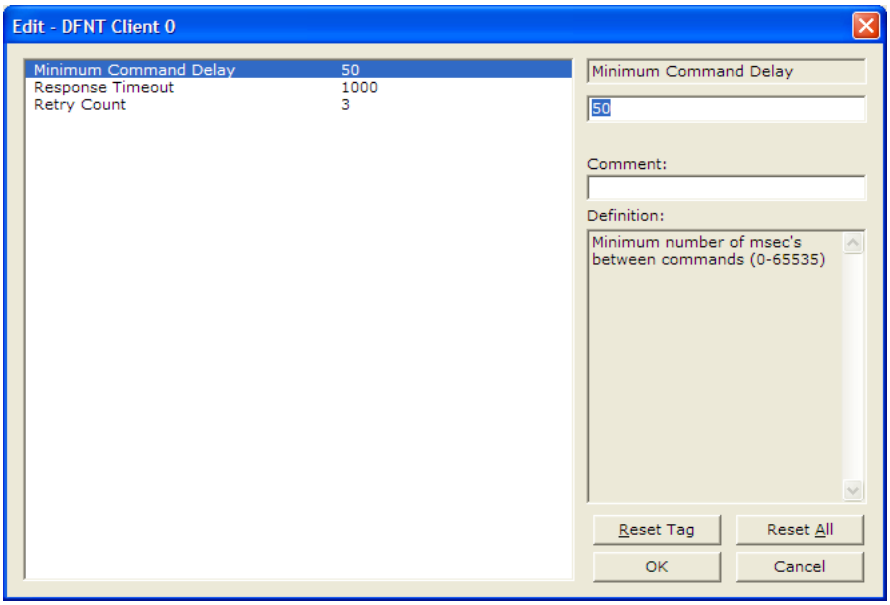
1. Click on the **[+]** sign next to the module icon to expand module information.
2. Click on the **[+]** sign next to any icon to view module information and configuration options.
3. Double-click any icon to open an *Edit* dialog box.
4. To edit a parameter, select the parameter in the left pane and make your changes in the right pane.
5. Click **OK** to save your changes.

Printing a Configuration File

1. Select the module icon, and then click the right mouse button to open a shortcut menu.
2. On the shortcut menu, choose **VIEW CONFIGURATION.** This action opens the *View Configuration* window.
3. In the *View Configuration* window, open the **FILE** menu, and choose **PRINT.** This action opens the *Print* dialog box.
4. In the *Print* dialog box, choose the printer to use from the drop-down list, select printing options, and then click **OK.**

3.2 [DFNT Client x]

This section defines the configuration for the DFNT Client (master) device simulated on network port



3.2.1 Minimum Command Delay

0 to **65535** milliseconds

This parameter specifies the number of milliseconds to wait between the initial issuances of a command. This parameter can be used to delay all commands sent to servers to avoid "flooding" commands on the network. This parameter does not affect retries of a command as they will be issued when failure is recognized.

3.2.2 Response Timeout

0 to **65535** milliseconds

This is the time in milliseconds that a Client will wait before re-transmitting a command if no response is received from the addressed server. The value to use depends on the type of communication network used, and the expected response time of the slowest device on the network.

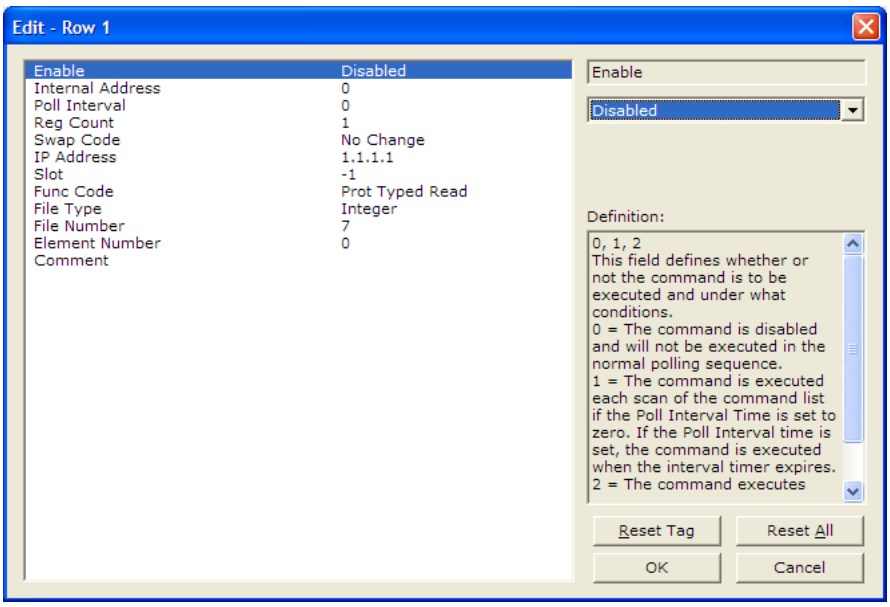
3.2.3 Retry Count

0 to **10**

This parameter specifies the number of times a command will be retried if it fails.

3.3 [DFNT Client x Commands]

This section defines the EtherNet/IP commands to be issued from the module to server devices on the network. These commands can be used for data collection and/or control of devices on the TCP/IP network.



3.3.1 Command List

In order to interface the virtual database with DF1 slave devices, you must construct a command list. The commands in the list specify the DF1 slave device to be utilized, the function to be performed (read or write), the data area in the device to interface with and the position in the virtual database to be associated with the device data. There is a separate command list for each DF1 master device emulated. The list is processed from top (command #0) to bottom. A poll interval parameter is associated with each command to specify a minimum delay time between the issuance of a command. If the user specifies a value of 10 for the parameter, the command will be executed no more frequently than every 10 seconds for the serial implementation and 1 second for the network implementation.

Write commands have a special feature, as they can be set to execute only if the data in the write command changes. If the data in the command has not changed since the command was last issued, the command will not be executed. If the data in the command has changed since the command was last issued, the command will be executed. Use of this feature can lighten the load on the DF1 network. In order to implement this feature; set the enable code for the command to a value of 2.

If the module is configured for the serial DF1 half-duplex protocol, the module can act as a master device routing messages between attached slave devices. This peer-to-peer communication is defined in the DF1 protocol specification. The master polls each DF1 slave device until no more data is available from the device. Response messages from the slaves that have a destination address that do not match the module are routed with a request message header back out onto the network. This facility offers communication between the slave devices for control and data monitoring. This feature is not available if the module is configured for DF1 full-duplex mode (point-to-point).

The module supports numerous commands. This permits the module to interface with a wide variety of DF1 protocol devices. This includes PLC2, PLC5, SLC-500 series, MicroLogix and ControlLogix processors. Additionally, other devices supplied by Rockwell Automation that use the DF1 protocol are supported.

The format of each command in the list depends on the function being executed. To simplify command construction, the module uses its own set of function codes to associate a command with a DF1 command/function type. The tables below list the functions supported by the module:

Basic Command Set Functions

Function Code	Command	Function	Definition	PLC5	SLC500 & MicroLogix	Power-monitor II	ControlLogix
1	0x00	N/A	Protected Write	X			X
2	0x01	N/A	Unprotected Read	X	X		X
3	0x02	N/A	Protected Bit Write	X			X
4	0x05	N/A	Unprotected Bit Write	X			X
5	0x08	N/A	Unprotected Write	X	X		X

PLC-5 Command Set Functions

Function Code	Command	Function	Definition	PLC5	SLC500 & MicroLogix	Power-monitor II	ControlLogix
100	0x0F	0x00	Word Range Write (Binary Address)	X			X
101	0x0F	0x01	Word Range Read (Binary Address)	X			X
102	0x0F	0x26	Read-Modify-Write (Binary Address)	X			X
150	0x0F	0x00	Word Range Write (ASCII Address)	X			X
151	0x0F	0x01	Word Range Read (ASCII Address)	X			X
152	0x0F	0x26	Read-Modify-Write (ASCII Address)	X			X

SLC-500 Command Set Functions

Function Code	Command	Function	Definition	PLC5	SLC500 & MicroLogix	Power-monitor II	ControlLogix
501	0x0F	0xA1	Protected Typed Logical Read With Two Address Fields		X		X
502	0x0F	0XA2	Protected Typed Logical Read With Three Address Fields		X	X	X
509	0x0F	0XA9	Protected Typed Logical Write With Two Address Fields		X		X
510	0x0F	0XAA	Protected Typed Logical Write With Three Address Fields		X	X	X
511	0x0F	0XAB	Protected Typed Logical Write With Mask (Three Address Fields)		X		X

Each command list record has the same general format. The first part of the record contains the information relating to the communication module and the second part contains information required to interface to the DF1 or EtherNet/IP slave device.

3.3.2 Command Entry Formats

The format of each command in the list depends on the function being executed. Refer to Command Function Codes (page 38) for a complete discussion of the commands supported by the module and of the structure and content of each command.

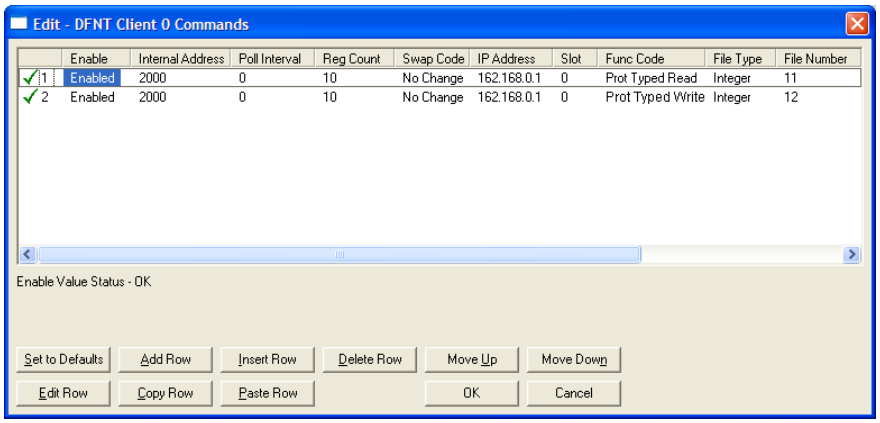
The following table shows the structure of the configuration data necessary for each of the supported commands.

Module Information Data							Device Information Data					
Column #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Function Code	**Enable Code**	**Internal Address**	**Poll Interval Time**	**Count**	**Swap Code**	**IP Address**	**Slot Number**	**Function Code**	**Function Parameters**			
FC 1	Code	Register	Seconds	Count	Code	Node	Slot	1	Word Address			
FC 2	Code	Register	Seconds	Count	Code	Node		2	Word Address			
FC 3	Code	Register	Seconds	Count	Code	Node		3	Word Address			
FC 4	Code	Register	Seconds	Count	Code	Node		4	Word Address			
FC 5	Code	Register	Seconds	Count	Code	Node		5	Word Address			
FC 100	Code	Register	Seconds	Count	Code	Node		100	File Number	Element	Sub-Element	
FC 101	Code	Register	Seconds	Count	Code	Node		101	File Number	Element	Sub-Element	
FC 102	Code	Register	Seconds	Count	Code	Node		102	File Number	Element	Sub-Element	
FC 150	Code	Register	Seconds	Count	Code	Node		150	File String			
FC 151	Code	Register	Seconds	Count	Code	Node		151	File String			
FC 152	Code	Register	Seconds	Count	Code	Node		152	File String			
FC 501	Code	Register	Seconds	Count	Code	Node		501	File Type	File Number	Element	
FC 502	Code	Register	Seconds	Count	Code	Node		502	File Type	File Number	Element	Sub-Element
FC 509	Code	Register	Seconds	Count	Code	Node		509	File Type	File Number	Element	
FC 510	Code	Register	Seconds	Count	Code	Node		510	File Type	File Number	Element	Sub-Element

Module Information Data							Device Information Data					
Column #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Function Code	**Enable Code**	**Internal Address**	**Poll Interval Time**	**Count**	**Swap Code**	**IP Address**	**Slot Number**	**Function Code**	**Function Parameters**			
FC 511	Code	Register	Seconds	Count	Code	Node		511	File Type	File Number	Element	Sub-Element

IP Address = IP address of processor to reach
Slot Number = -1 for PLC5 & SLC, processor slot number of ControlLogix

The first part of the record is the Module Information, which relates to the module. The second part contains information required to interface to the Server device. An example of a command list section of the configuration file is shown in the following illustration.




```
[DFNT Client 0 Commands]
#
# The file contains examples for a ControlLogix processor with the N7 file
# configured. This example uses SLC and PLC5 commands.
#
# LOCATION      :
# DATE          : 04/05/2000
# CONFIGURED BY: RAR
# MODIFIED      :
#
#   1     2      3     4    5  6                  7    8    9   10   11   12
#        DB    Poll       Swap                      Func File File  Elm  Sub
#Enab  Addr   Delay Count Code  Node IP Address Slot Code Type    #    #  Elm
START
#     1  2000      0    10    0  192.168.0.100      0  501    N   11    0
#     1  2000      0    10    0  192.168.0.100      0  509    N   12    0
#
#        DB    Poll       Swap                      Func File  Elm  Sub
#Enab  Addr   Delay Count Code  Node IP Address Slot Code    #    #  Elm
END
```

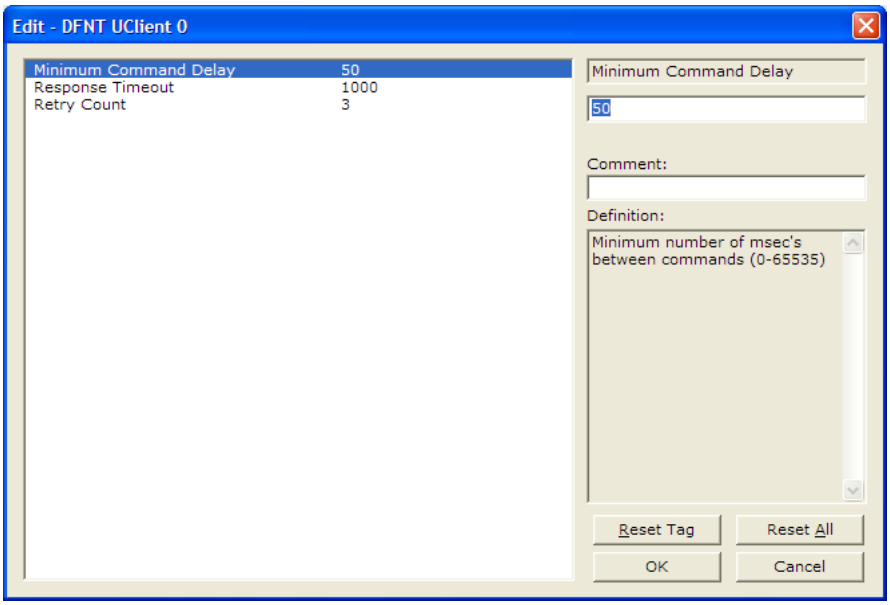
The following table describes each parameter

<table>
<tr><th>Parameter</th><th>Range</th><th>Description</th></tr>
<tr><td>Enable</td><td>0, 1, 2</td><td>This field defines whether the command is to be executed and under what conditions.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>The command is disabled and will not be executed in the normal polling sequence.</td></tr>
<tr><td>1</td><td>The command is executed each scan of the command list if the Poll Interval Time is set to zero. If the Poll Interval time is set, the command is executed when the interval timer expires.</td></tr>
<tr><td>2</td><td>The command executes only if the internal data associated with the command changes. This value is valid for write commands only.</td></tr>
</table></td></tr>
<tr><td>Internal Address</td><td>0 to 3999</td><td>This field specifies the database address in the module's internal database to be associated with the command. If the command is a read function, the data received in the response message is placed at the specified location. If the command is write function, data used in the command is sourced from the specified data area.</td></tr>
<tr><td>Poll Delay</td><td>0 to 1000</td><td>This parameter specifies the minimum interval to execute continuous commands (Enable code of 1). The parameter is entered in 1/10th of a second. Therefore, if a value of 100 is entered for a command, the command executes no more frequently than every 10 seconds.</td></tr>
<tr><td>Count</td><td>Command dependent.</td><td>This parameter specifies the number of registers or digital points to be associated with the command. See Command Function Codes (page 38) for information</td></tr>
<tr><td>Swap Code</td><td>0, 1, 2, 3</td><td>This parameter defines if the data received from the Server is to be ordered differently than that received from the Server device. This parameter is helpful when dealing with floating-point or other multi-register values, as there is no standard method of storage of these data types in Server devices. This parameter can be set to order the register data received in an order useful by other applications. The following table defines the values and their associated operations:
<table>
<tr><th>Swap Code</th><th>Description</th></tr>
<tr><td>0</td><td>None - No Change is made in the byte ordering (1234 = 1234)</td></tr>
<tr><td>1</td><td>Words - The words are swapped (1234=3412)</td></tr>
<tr><td>2</td><td>Words & Bytes - The words are swapped then the bytes in each word are swapped (1234=4321)</td></tr>
<tr><td>3</td><td>Bytes - The bytes in each word are swapped (1234=2143)</td></tr>
</table>
The words should be swapped only when using an even number of words.</td></tr>
<tr><td>Node IP Address</td><td>xxx.xxx.xxx.xxx</td><td>The IP address of the device being addressed by the command.</td></tr>
<tr><td>Slot</td><td></td><td>When addressing a ControlLogix processor, the slot number corresponds to the slot in the rack containing the controller being addressed. In the ControlLogix platform, the controller can be placed in any slot and the rack may contain multiple processors. This parameter uniquely selects a controller in the rack.
Use a value of -1 when interfacing to an SLC 5/05 or a
PLC5. These devices do not have a slot number.</td></tr>
</table>

<table>
<tr><th>Parameter</th><th>Range</th><th>Description</th></tr>
<tr><td>Function Code</td><td>See Command Function Codes (page 38)</td><td>These parameters specify the function to be executed by the command. The Reference chapter in this manual describes the meaning of these values for each of the available supported commands. Following is a complete list of the command supported by the Client driver.
Function Code Listing
Basic Command Set
<table>
<tr><td>1</td><td>Protected Write</td></tr>
<tr><td>2</td><td>Unprotected Read</td></tr>
<tr><td>3</td><td>Protected Bit Write</td></tr>
<tr><td>4</td><td>Unprotected Bit Write</td></tr>
<tr><td>5</td><td>Unprotected Write</td></tr>
</table>
PLC-5 Command Set (0x0F)
<table>
<tr><td>100</td><td>Word Range Write (Binary Address)</td></tr>
<tr><td>101</td><td>Word Range Read (Binary Address)</td></tr>
<tr><td>102</td><td>Read-Modify-Write (Binary Address)</td></tr>
<tr><td>150</td><td>Word Range Write (ASCII Address)</td></tr>
<tr><td>151</td><td>Word Range Read (ASCII Address)</td></tr>
<tr><td>152</td><td>Read-Modify-Write (ASCII Address)</td></tr>
</table>
SLC Command Set (0x0F)
<table>
<tr><td>501</td><td>Prot Typed Read with 2 addr fields</td></tr>
<tr><td>502</td><td>Prot Typed Read with 3 addr fields</td></tr>
<tr><td>509</td><td>Prot Typed Write with 2 addr fields</td></tr>
<tr><td>510</td><td>Prot Typed Write with 3 addr fields</td></tr>
<tr><td>511</td><td>Prot Type Write with Mask 3 addr field</td></tr>
</table></td></tr>
<tr><td>Function Parameters</td><td>See Command Function Codes (page 38)</td><td>The number of auxiliary parameters required depends on the function code selected for the command.</td></tr>
</table>

3.4 [DFNT UClient 0]

This section defines the configuration for the unconnected master device simulated on network port



3.4.1 Minimum Command Delay

0 to **65535** milliseconds

This parameter specifies the number of milliseconds to wait between the initial issuances of a command. This parameter can be used to delay all commands sent to servers to avoid "flooding" commands on the network. This parameter does not affect retries of a command as they will be issued when failure is recognized.

3.4.2 Response Timeout

0 to **65535** milliseconds

This is the time in milliseconds that a Client will wait before re-transmitting a command if no response is received from the addressed server. The value to use depends on the type of communication network used, and the expected response time of the slowest device on the network.

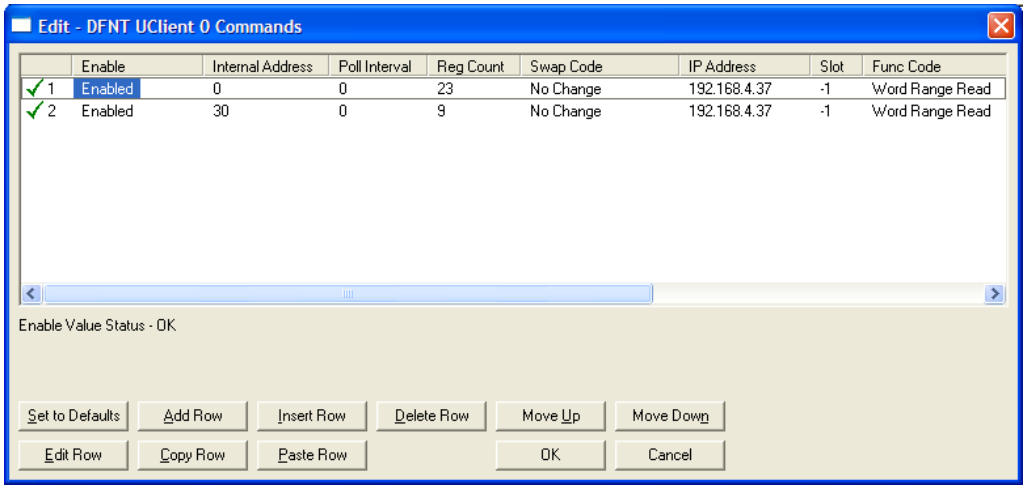
3.4.3 Retry Count

0 to **10**

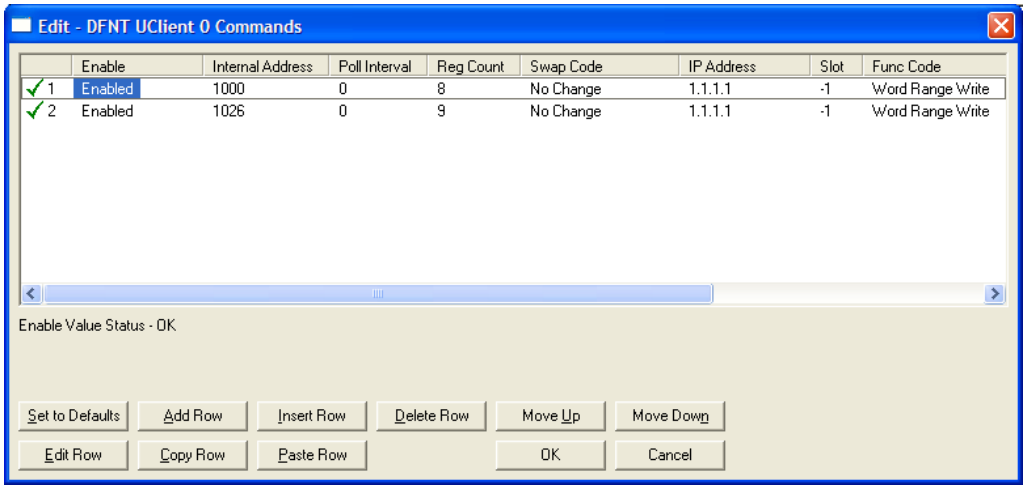
This parameter specifies the number of times a command will be retried if it fails.

3.5 [DFNT UClient 0 Commands]

Example PLC5 Binary Command List



Example PLC5 ASCII Command List



Refer to Command List for a description of command list syntax.

3.6 Using the CommonNet Data Map

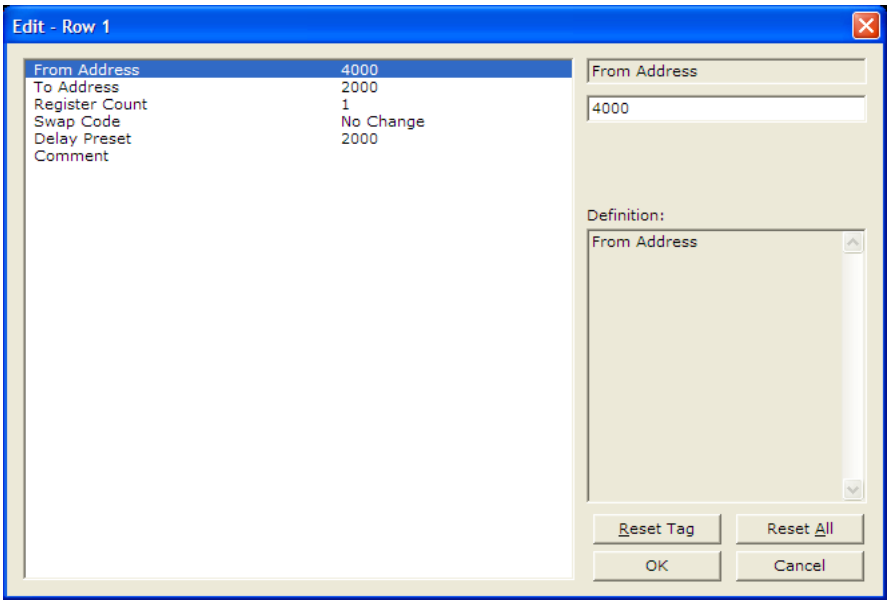
The *Data Map* section allows you to copy data between areas in the module's internal database.

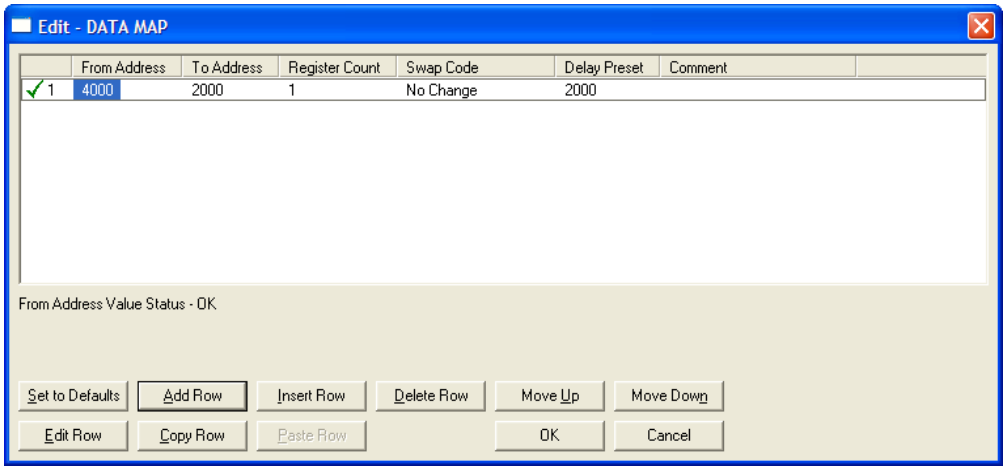
You can copy a maximum of 100 registers per *Data Map* command, and you can configure a maximum of 200 separate copy commands.

You can copy data from the error or status tables in upper memory to internal database registers in the *User Data memory* area.

You can rearrange the byte and/or word order during the copy process. For example, by rearranging byte or word order, you can convert floating-point values to the correct format for a different protocol.

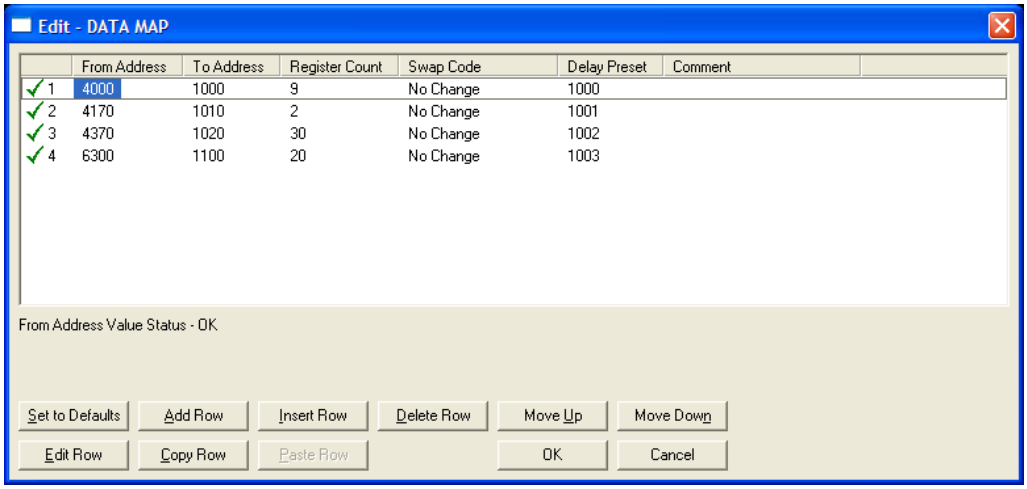
You can also use the *Data Map* to condense widely dispersed data into one contiguous data block, making it easier to access.





3.6.1 Moving Data

The following illustration shows an example Data Map. The Data Map allows you to move data to different addresses within the module database in order to create simpler data requests and control.



3.6.2 From Address

0 to highest *Status Data* address

This field specifies the beginning internal database register address for the copy operation. This address can be any valid address in the *User Data Area* or the *Status Data Area* of the gateway.

3.6.3 To Address

0 to **3999**

This parameter specifies the beginning destination register address for the copy operation. This address must always be within the *User Data registers* area. Take care to specify a destination address that will not overwrite data that has been stored in memory by one of the communication protocols running on the gateway.

3.6.4 Register Count

1 to **100**

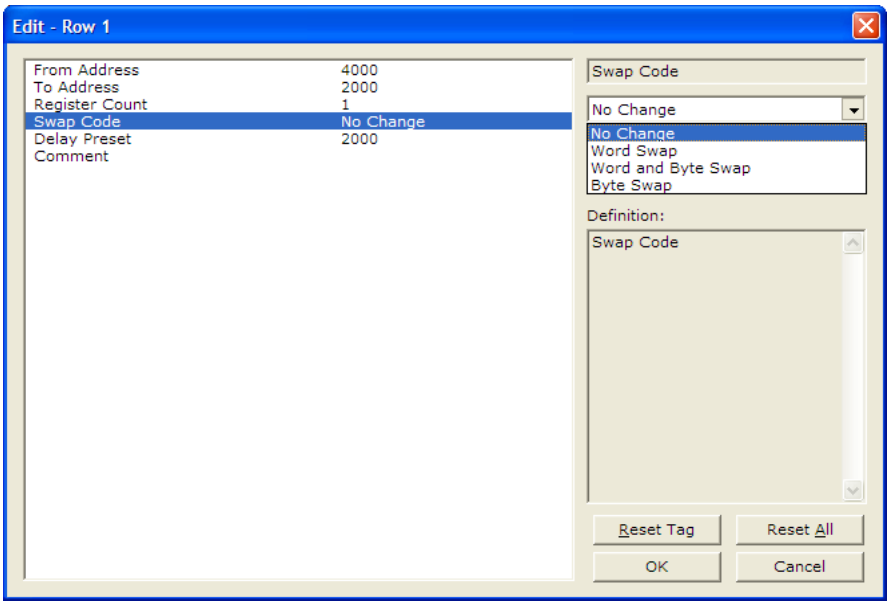
This parameter specifies the number of registers to copy.

3.6.5 Swap Code

NO CHANGE, **WORD SWAP**, **WORD AND BYTE SWAP**, **BYTE SWAP**

You may need to swap the order of the bytes in the registers during the copy process in order to change the alignment of bytes between dissimilar protocols. This parameter is helpful when dealing with floating-point or other multi-register values, as there is no standard method of storage of these data types in slave devices.

The following table defines the values and their associated operations:



Swap Code	Description
No Swap	No change is made in the byte ordering (1234 = 1234)
Word Swap	The words are swapped (1234=3412)
Word and Byte Swap	The words are swapped, then the bytes in each word are swapped (1234=4321)
Bytes	The bytes in each word are swapped (1234=2143)

3.6.6 Delay Preset

This parameter sets an interval for each *Data Map* copy operation. The value you put for the *Delay Preset* is not a fixed amount of time. It is the number of firmware scans that must transpire between copy operations.

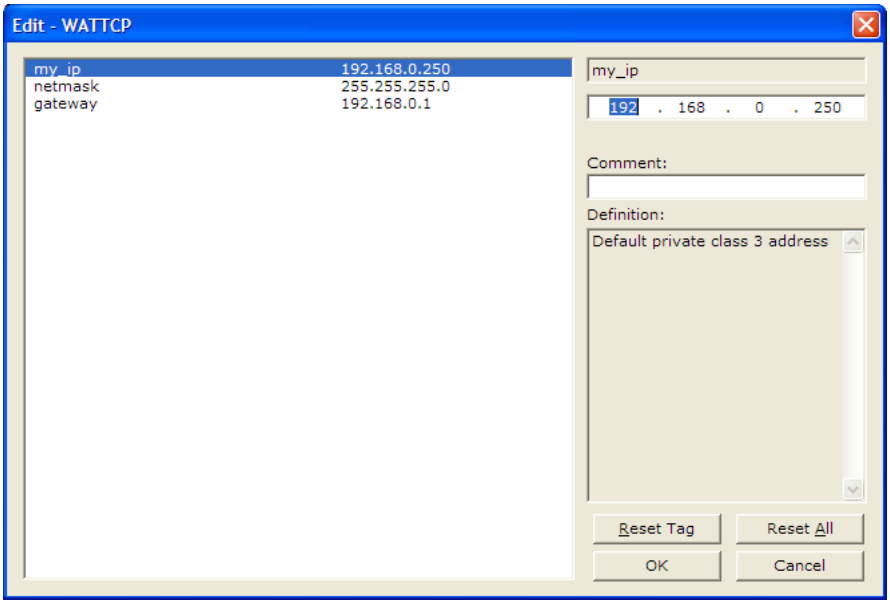
The firmware scan cycle can take a variable amount of time, depending on the level of activity of the protocol drivers running on the ProLinx gateway and the level of activity on the gateway's communication ports. Each firmware scan can take from 1 to several milliseconds to complete. Therefore, *Data Map* copy operations cannot be expected to happen at regular intervals.

If multiple copy operations (several rows in the *Data map* section) happen too frequently or all happen in the same update interval, they could delay the process scan of the gateway protocols, which could result in slow data updates or missed data on communication ports. To avoid these potential problems, you should set the *Delay Preset* to different values for each row in the *Data Map* section and set them to higher, rather than lower, numbers.

For example, *Delay Preset* values below 1000 could begin to cause a noticeable delay in data updates through the communication ports. And you should not set all *Delay Presets* to the same value. Instead, use different values for each row in the Data Map such as 1000, 1001, and 1002 or any other different *Delay Preset* values you like. This will prevent the copies from happening concurrently and prevent possible process scan delays.

3.7 Ethernet Port Configuration - wattcp.cfg

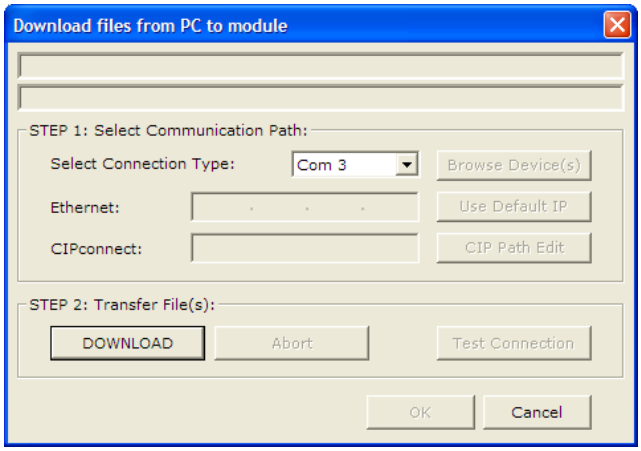
The wattcp.cfg file must be set up properly in order to use a TCP/IP network connection. The ProLinx Reference Guide provides detailed information on setting up this file, as well as how to load it to ProLinx modules.



3.8 Downloading the Project to the Module Using a Serial COM port

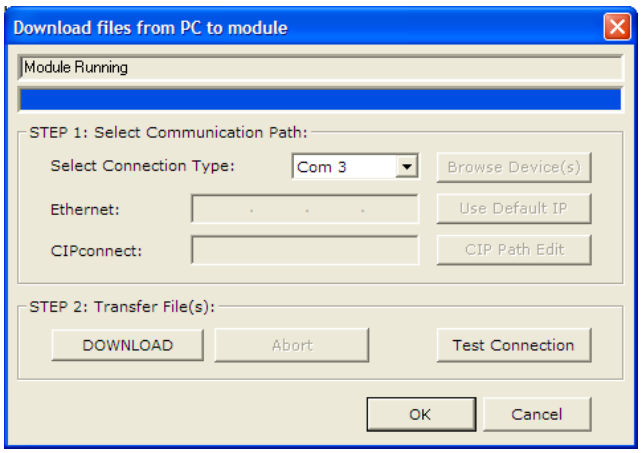
For the module to use the settings you configured, you must download (copy) the updated *Project* file from your PC to the module.

1. In the tree view in *ProSoft Configuration Builder*, click once to select the module.
2. Open the *Project* menu, and then choose **MODULE/DOWNLOAD**. The program will scan your PC for a valid com port (this may take a few seconds). When *PCB* has found a valid COM port, the *Download* dialog box will open.



3. Choose the COM port to use from the dropdown list, and then click the **DOWNLOAD** button.

   The module will perform a platform check to read and load its new settings. When the platform check is complete, the status bar in the *Download* dialog box will display the message *Module Running*.



4 Diagnostics and Troubleshooting

In This Chapter

There are two ways to troubleshoot ProLinx Gateways:

- Using the LEDs located on the front of the gateway
- Using the Debug port that provides a view into the gateway's internal database.

4.1 Using ProSoft Configuration Builder (PCB) for Diagnostics

The *Configuration and Debug* menu for this module is arranged as a tree structure, with the *Main* menu at the top of the tree, and one or more submenus for each menu command. The first menu you see when you connect to the module is the *Main* menu.

Because this is a text-based menu system, you enter commands by typing the [command letter] from your computer keyboard in the *Diagnostic* window in *ProSoft Configuration Builder (PCB)*. The module does not respond to mouse movements or clicks. The command executes as soon as you press the **[COMMAND LETTER]** — you do not need to press **[ENTER].** When you type a **[COMMAND LETTER]**, a new screen will be displayed in your terminal application.

4.1.1 Required Hardware

You can connect directly from your computer's serial port to the serial port on the module to view configuration information, perform maintenance, and send or receive configuration files.

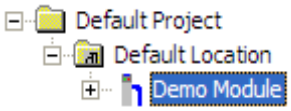
ProSoft Technology recommends the following minimum hardware to connect your computer to the module:

- 80486 based processor (Pentium preferred)
- 1 megabyte of memory
- At least one UART hardware-based serial communications port available. USB-based virtual UART systems (USB to serial port adapters) often do not function reliably, especially during binary file transfers, such as when uploading/downloading configuration files or module firmware upgrades.

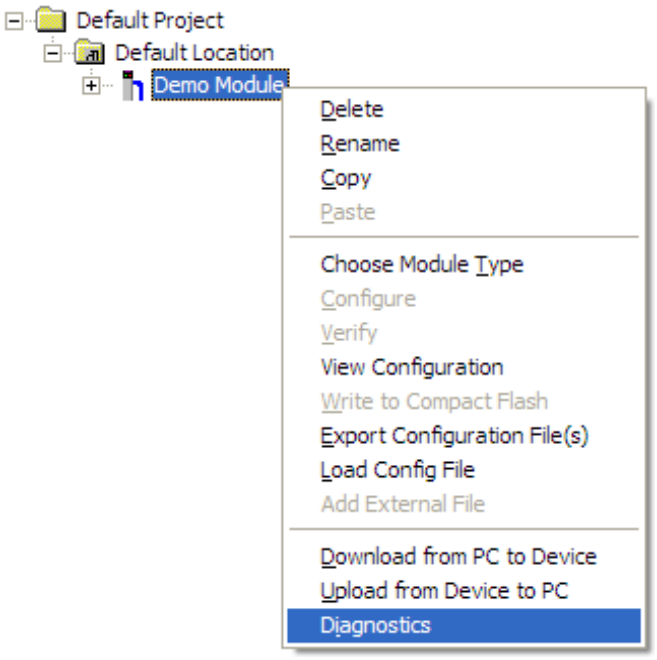
4.1.2 Using the Diagnostic Window in ProSoft Configuration Builder

To connect to the module's Configuration/Debug serial port

1. Start *PCB*, and then select the module to test. Click the right mouse button to open a shortcut menu.

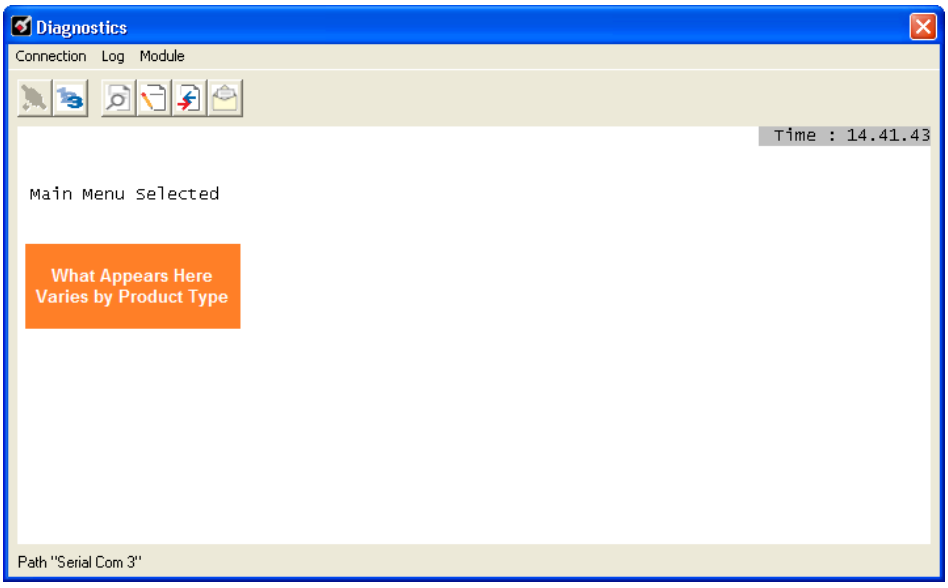


2 On the shortcut menu, choose **DIAGNOSTICS.**



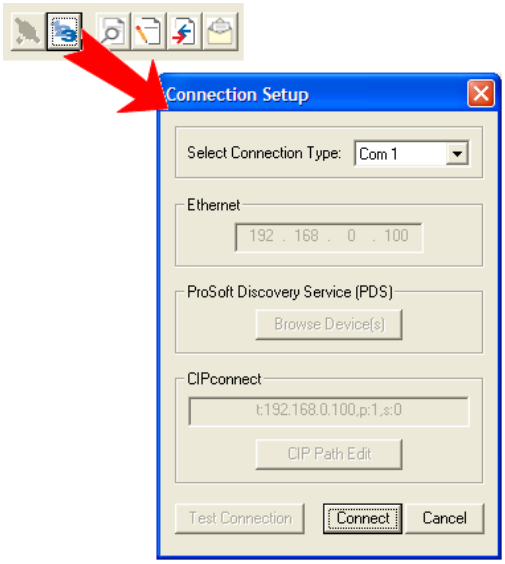
This action opens the *Diagnostics* dialog box.

3 Press **[?]** to open the *Main* menu.



If there is no response from the module, follow these steps:

1 Click to configure the connection. On the *Connection Setup* dialog box, select a valid com port or other connection type supported by the module.



2 Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.

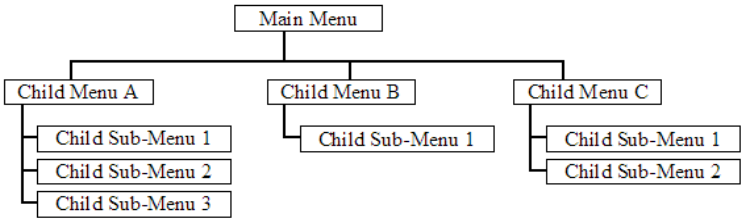
3 On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

If you are still not able to establish a connection, contact ProSoft Technology for assistance.

4.1.3 Navigation

All of the submenus for this module contain commands to redisplay the menu or return to the previous menu. You can always return from a submenu to the next higher menu by pressing **[M]** on your keyboard.

The organization of the menu structure is represented in simplified form in the following illustration:



The remainder of this section shows the menus available for this module, and briefly discusses the commands available to you.

Keystrokes

The keyboard commands on these menus are usually not case sensitive. You can enter most commands in lowercase or uppercase letters.

The menus use a few special characters (**?**, **-**, **+**, @) that must be entered exactly as shown. Some of these characters will require you to use the **SHIFT**, **CTRL**, or **ALT** keys to enter them correctly. For example, on US English keyboards, enter the **?** command as **SHIFT** and **/**.

Also, take care to distinguish the different uses for uppercase letter "eye" (**I**), lowercase letter "el" (**L**), and the number one (**1**). Likewise, uppercase letter "oh" (**O**) and the number zero (**0**) are not interchangeable. Although these characters look alike on the screen, they perform different actions on the module and may not be used interchangeably.

4.2 Base Module LEDs

LED	State	Description
Power	Off	Power is not connected to the power terminals or source is insufficient to properly power the module (minimum required is 800mA at 24 Vdc)
	Green Solid	Power is connected to the power terminals.
Fault	Off	Normal operation.
	Red Solid	A critical error has occurred. Program executable has failed or has been user-terminated and is no longer running. Press Reset p/b or cycle power to clear error. If not, use the Debug procedures described later in this manual.
Cfg	Off	Normal operation.
	Amber Solid	The unit is in configuration mode. The configuration file is currently being downloaded or, after power-up, is being read, the unit is implementing the configuration values, and initializing the hardware. This will occur during power cycle, or after pressing the reset button. It also occurs after a cold/warm boot command is received.
Err	Off	Normal operation.
	Flashing	An error condition has been detected and is occurring on one of the application ports. Check configuration and troubleshoot for communication errors.
	Solid Red	This error flag is cleared at the start of each command attempt (Master/Client) or on each receipt of data (slave/adapter/server); so, if this condition exists, it indicates a large number of errors are occurring in the application (due to bad configuration) or on one or more ports (network communication failures).

4.2.1 Ethernet LED Indicators

LED	State	Description
Data	OFF	No activity on the Ethernet port.
	GREEN Flash	The Ethernet port is actively transmitting or receiving data.
Link	OFF	No physical network connection is detected. No Ethernet communication is possible. Check wiring and cables.
	GREEN Solid	Physical network connection detected. This LED must be ON solid for Ethernet communication to be possible.

4.3 Client Error/Status Data

The second and most thorough troubleshooting method for debugging the operation of the DFNT driver (and the module in general) is the powerful Debug port on the module which provides much more complete access to the internal operation and status of the module. Accessing the Debug capabilities of the module is accomplished easily by connecting a PC to the Debug port and loading a terminal program such as ProSoft Configuration Builder or HyperTerminal.

The Client connection Error and Status Data areas are discussed in this section

The error/status data table is located in virtual address assigned by ProLinx. If the address is set to -1, the data will not be placed in the database. It will only be available through the Configuration/Debug Port. If a valid address value is assigned, the module will update the data area.

The data area is initialized with zeros whenever the module is initialized. This occurs during a cold-start (power-on), reset (reset push-button pressed) or a warm-boot operation (commanded or loading of new configuration).

Note: The *ProLinx Reference Guide* contains detailed information on accessing the contents of the following registers.

4.3.1 DFNT Client 0 Status

Internal Database Address	Offset	Description
7900	0	Number of Command Requests
7901	1	Number of Command Responses
7902	2	Number of Command Errors
7903	3	Number of Requests
7904	4	Number of Responses
7905	5	Number of Errors Received
7906	6	Number of Errors Sent
7907	7	Configuration Error Code
7908	8	Current Error Code
7909	9	Last Error Code

4.3.2 Unconnected Msg DFNT Client 0 Status

Status Register	Description
12800	Command Request Count
12801	Command Response Count
12802	Command Error Count
12803	Number of Request Packets
12804	Number of Response Packets
12805	Errors Sent
12806	Errors Received
12807	Configuration Error Word
12808	Current Error
12809	Last Error
12810 to 12909	Command List Errors
12910 to 12999	No Valid Data

4.3.3 DFNT Client 1 through 4 Status

DFNT Clients 1 through 4 have the same description and order as shown in the DFNT Client 0 Status Table. The following table shows the internal database addresses for clients 1 through 4:

DFNT Client	Address Range
1	8100 through 8109
2	8300 through 8309
3	8500 through 8509
4	8700 through 8709

4.3.4 DFNT Server 0

Internal Database Address	Description
8900	Socket Size
8901	Connection State
8902	Socket Open Count
8903	Socket Established Count
8904	Socket Close Count
8905	Socket Read Count
8906	Processed Message Count
8907	Socket Write Count
8908	Socket Timeout Count
8909	Host s_type
8910	Host Port
8911	Host IP
8912	Host IP
8913	Reserved
8914	Reserved
8915	Reserved

4.3.5 DFNT Servers 1 Through 4

DFNT Servers 1 through 4 have the same description and order as shown in the DFNT Server 0 Status Table. The following table shows the internal database addresses for servers 1 through 4:

DFNT Server	Address Range
1	8916 through 8931
2	8932 through 8947
3	8948 through 8963
4	8964 through 8981

The following table defines the values represented in the Connection State parameter:

State	Definition
0	No session exists on socket
1	Session established but no connections
2	Session established and connected

4.3.6 DF1 Pass-Through Server

Internal Database Address	Description
8982	Socket Size
8983	Connection State
8984	Socket Open Count
8985	Socket Established Count
8986	Socket Close Count
8987	Socket Read Count
8988	Processed Message Count
8989	Socket Write Count
8990	Socket Timeout Count
8991	Host s_type
8992	Host Port
8993	Host IP
8994	Host IP
8995	Reserved
8996	Reserved
8997	Reserved
8998	No Valid Data
8999	No Valid Data

Refer to Error Codes to interpret the status/error codes present in the data area.

4.4 EtherNet/IP Client Command List Error Data

Each command in the command list for each EtherNet/IP client has a reserved word value for a status/error code. This error data list can be read using the Debug/Config Port and can be placed in the module's internal database. Each network client has its own register location parameter.

The first word in the register location defined contains the status/error code for the first command in the client's command list. Each successive word in the command error list is associated with the next command in the list. Therefore, the size of the data area is dependent upon the number of commands defined. The structure of the data area is displayed in the following tables:

4.4.1 DFNT Client 0 (Command List Error Data)

Internal Database Address	Offset	Description
7910	0	Command #0 Error Status
7911	1	Command #1 Error Status
7912	2	Command #2 Error Status
7913	3	Command #3 Error Status
7914	4	Command #4 Error Status
	.	.
	.	.
	.	.
8007	97	Command #97 Error Status
8008	98	Command #98 Error Status
8009	99	Command #99 Error Status

4.4.2 DFNT Client 1 Through 4 Command List Error Addresses

DFNT clients 1 through 4 have the same description and order as shown in the DFNT Client 0 Status Table. The following table shows the internal database addresses for clients 1 through 4:

DFNT Client	Address Range
1	8100 through 8209
2	8310 through 8409
3	8510 through 8609
4	8710 through 8809

Note that the values in the Command List Error Status tables are initialized to zero(0) at power-up, cold boot and during warm boot. Refer to the following topic containing Error Codes to interpret the status/error codes present in the data area.

4.5 Error Codes

The module error codes are listed in this section. Error codes returned from the command list process are stored in the command list error memory region. A word is allocated for each command in the memory area. The error codes are formatted in the word as follows: The least-significant byte of the word contains the extended status code and the most-significant byte contains the status code.

Use the error codes returned for each command in the list to determine the success or failure of the command. If the command fails, use the error code to determine the cause of failure.

Note: The Module Specific error codes (not DF1 compliant) are returned from within the module and never returned from an attached DF1 slave device. These are error codes that are part of the DF1 protocol or are extended codes unique to this module. The standard DF1 error codes can be found in the DF1 Protocol and Command Set Reference Manual (Publication 1770-6.5.16) from Rockwell Automation. The most common errors for the DF1 protocol are shown in the following tables:

4.5.1 Local STS Error Codes

Code (Int)	Code (Hex)	Description
0	0x0000	Success, no error
256	0x0100	DST node is out of buffer space
512	0x0200	Cannot guarantee delivery (Link Layer)
768	0x0300	Duplicate token holder detected
1024	0x0400	Local port is disconnected
1280	0x0500	Application layer timed out waiting for response
1536	0x0600	Duplicate node detected
1792	0x0700	Station is offline
2048	0x0800	Hardware fault

4.5.2 Remote STS Error Codes

Code (Int)	Code (Hex)	Description
0	0x0000	Success, no error
4096	0x1000	Illegal command or format
8192	0x2000	Host has a problem and will not communicate
12288	0x3000	Remote node host is missing, disconnected or shut down
16384	0x4000	Host could not complete function due to hardware fault
20480	0x5000	Addressing problem or memory protect rungs
24576	0x6000	Function not allowed due to command protection selection
26872	0x7000	Processor is in Program mode
-32768	0x8000	Compatibility mode file missing or communication zone problem
-28672	0x9000	Remote node cannot buffer command
-24576	0xA000	Wait ACK (1775-KA buffer full)
-20480	0xB000	Remote node problem due to download
-16384	0xC000	Wait ACK (1775-KA buffer full)
-12288	0xD000	Not used
-8192	0xE000	Not used
	0xF0nn	Error code in the EXT STS byte (nn contains EXT error code)

4.5.3 Errors When EXT STS Is Present

Code (Int)	Code (Hex)	Description
-4096	0xF000	Not used
-4095	0xF001	A field has an illegal value
-4094	0xF002	Less levels specified in address than minimum for any address
-4093	0xF003	More levels specified in address than system supports
-4092	0xF004	Symbol not found
-4091	0xF005	Symbol is of improper format
-4090	0xF006	Address does not point to something usable
-4089	0xF007	File is wrong size
-4088	0xF008	Cannot complete request
-4087	0xF009	Data or file is too large
-4086	0xF00A	Transaction size plus word address is too large
-4085	0xF00B	Access denied, improper privilege
-4084	0xF00C	Condition cannot be generated - resource is not available
-4083	0xF00D	Condition already exists - resource is already available
-4082	0xF00E	Command cannot be executed
-4081	0xF00F	Histogram overflow
-4080	0xF010	No access
-4079	0xF011	Illegal data type
-4078	0xF012	Invalid parameter or invalid data
-4077	0xF013	Address reference exists to deleted area
-4076	0xF014	Command execution failure for unknown reason
-4075	0xF015	Data conversion error
-4074	0xF016	Scanner not able to communicate with 1771 rack adapter
-4073	0xF017	Type mismatch
-4072	0xF018	1171 module response was not valid
-4071	0xF019	Duplicate label
-4070	0xF01A	File is open; another node owns it
-4069	0xF01B	Another node is the program owner
-4068	0xF01C	Reserved
-4067	0xF01D	Reserved
-4066	0xF01E	Data table element protection violation
-4065	0xF01F	Temporary internal problem

4.5.4 Module Specific Error (not DFNT Compliant)

Code (Int)	Code (Hex)	Description
-1	0xFFFF	CTS modem control line not set before transmit
-2	0xFFFE	Timeout while transmitting message
-10	0xFFF6	Timeout waiting for DLE-ACK after request
-11	0xFFF5	Timeout waiting for response after request
-12	0xFFF4	Reply data does not match requested byte count
-20	0xFFEC	DLE-NAK received after request
-21	0xFFEB	DLE-NAK sent after response
-200	0xFF38	DLE-NAK received after request

4.6 TCP/IP Interface Errors

4.6.1 Timeout Errors

Error (Int)	Error (Hex)	Description
-33	0xFFDF	Failed to connect to target
-34	0xFFDE	Failed to register session with target (timeout)
-35	0xFFDD	Failed forward open response timeout
-36	0xFFDC	PCCC command response timeout
-37	0xFFDB	No TCP/IP connection error
-47	0xFFD9	ARP could not resolve MAC from IP (bad IP address, not part of a network, invalid parameter to ARP routine).
-48	0xFFD7	Error during ARP operation: the response to the ARP request did not arrive to the module after a 5 second timeout.

Note: When the client gets error -47 or -48, it uses the adjustable ARP Timeout parameter in the configuration file to set an amount of time to wait before trying again to connect to this non-existent server. This feature allows the client to continue sending commands and polling other existing servers, while waiting for the non-existent server to appear on the network.

4.6.2 Register Session Response Errors

Error (Int)	Error (Hex)	Description
-49	0xFFCF	Invalid response length
-50	0xFFCE	Command field invalid
-51	0xFFCD	Invalid length field parameter
-52	0xFFCC	Status error reported
-53	0xFFCB	Context field not matched
-54	0xFFCA	Invalid version

4.6.3 Forward Open Response Errors

Error (Int)	Error (Hex)	Description
-65	0xFFBF	Message Length received not valid
-66	0xFFBE	Command code returned not valid
-67	0xFFBD	Session handle field invalid
-68	0xFFBC	Status error reported
-69	0xFFBB	Context field not matched
-70	0xFFBA	CPF item count not correct
-71	0xFFB9	CPF address field error
-72	0xFFB8	CPF packet tag invalid
-73	0xFFB7	CPF bad command code
-74	0xFFB6	CPF invalid IOI
-75	0xFFB5	CPF status error reported

4.6.4 PCCC Response Errors

Error (Int)	Error (Hex)	Description
-81	0xFFAF	Message Length received not valid
-82	0xFFAE	Command code returned not valid
-83	0xFFAD	Session handle field invalid
-84	0xFFAC	Status error reported
-85	0xFFAB	Context field not matched
-86	0xFFAA	CPF item count not correct
-87	0xFFA9	CPF address field error
-88	0xFFA8	CPF packet tag invalid
-89	0xFFA7	CPF bad command code
-90	0xFFA6	CPF invalid IOI
-91	0xFFA5	CPF status error reported
-92	0xFFA4	
-93	0xFFA3	TSN in PCCC message not matched
-94	0xFFA2	CPF not correct message number
-95	0xFFA1	CPF incorrect connection ID value returned
-96	0xFFA0	Incorrect session handle returned

5 Reference

In This Chapter

5.1 Command Function Codes

In the following discussion, the Column values are described for the serial DFCM Command list (See Node Address parameter #6). In the DFNT module, the Node address has been replaced with two parameters; the IP Address and the Slot Number, causing the Function Code and Function Parameters to occupy positions 8 to 12 instead of 7 to 11. Aside from this difference, all other information is correct.

DFNT Configuration Form

Module Information Data						Device Information Data					
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Enable Code	Internal Address	Poll Interval Time	Count	Swap Code	IP Address	Slot Number	Function Code	Function Parameters			

DFNT Command Structure

Module Information Data							Device Information Data					
Column #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Function Code	Enable Code	Internal Address	Poll Interval Time	Count	Swap Code	IP Address	Slot Number	Function Code	Function Parameters			

5.2 General Command Structure

	DF1 Master Port Command Structure (File for each Master Port)	Description
Communication Module Information	Enable/Type Word	0=Disabled, 1=Continuous, 2=Conditional and 999=Poll. The conditional type only applies to the write functions.
	Virtual Database Address	This parameter defines the virtual database register to be associated with the command.
	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.
	Count	Number of data values or registers to be considered by the function.
	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.
Device Information	Node Address	Node address of unit to be reached on the data highway.
	Function Code	This parameter defines the module function code to be associated with the command. Each function code requires a set of parameters to construct the DF1 message.
	Parameters	Up to four parameter fields can follow the function code field to define the element or data register to be considered by the function.

Note that the Node Address field in the serial implementation has been expanded to two fields: IP Address and Slot Number in the DFNT Ethernet implementation. This is required for network support. The IP Address specifies the IP address of the device to reach on the network. The Slot Number has specific meaning determined by the processor. For ControlLogix processors, the Slot Number is the location in the ControlLogix rack of the processor. For a four-slot rack, this parameter would have a valid range of 0 to 3. For the PLC5 and SLC family of processors, the Slot Number parameter is always set to -1. These processors do not have a slot number in the path field as the Ethernet interface is resident on the processor.

The following tables define the parameters required for each function.

5.2.1 Function Code #1 - Protected Write (Basic Command Set)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 1	Protected Write Function	
9	Word Address	Word address where to start the write operation.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function writes one or more words of data into a limited area of the slave device. This function should work on the following devices: 1774-PLC, PLC-2, PLC-3, PLC-5 and PLC-5/250.

5.2.2 Function Code #2 - Unprotected Read (Basic Command Set)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled and 1=Continuous.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 2	Unprotected Read Function	
9	Word Address	Word address where to start the read operation.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function reads one or more words of data from the PLC memory. This function should work on the following devices: 1774-PLC, PLC-2, PLC-3, PLC-5, SLC 500, SLC 5/03, SLC 5/04 and MicroLogix 1000.

5.2.3 Function Code #3 - Protected Bit Write (Basic Command Set)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
	Virtual Database Address	This parameter defines the database address for the data to be associated with the command. The address defined represents a register address and not a bit address. This function will update one or more words of data as defined by the count parameter.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: Always zero (0).	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 3	Protected Bit Write Function	
9	Word Address	Word address where to start the write operation.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function sets or resets individual bits within a limited area of the PLC data table. This function should work on the following devices: 1774-PLC, PLC-2, PLC-3, PLC-5 and PLC-5/250.

5.2.4 Function Code #4 - Unprotected Bit Write (Basic Command Set)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address for the data to be associated with the command. The address defined represents a register address and not a bit address. This function will update one or more words of data as defined by the count parameter.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: Always zero (0).	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 4	Unprotected Bit Write Function	
9	Word Address	Word address where to start the write operation.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function sets or resets individual bits within a limited area of the PLC data table. This function should work on the following devices: 1774-PLC, PLC-2, PLC-3 and PLC-5.

5.2.5 Function Code #5 - Unprotected Write (Basic Command Set)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 5	Unprotected Write Function	
9	Word Address	Word address where to start the write operation.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function writes one or more words of data to the PLC memory. This function should work on the following devices: 1774-PLC, PLC-2, PLC-3, PLC-5, SLC 500, SLC 5/03, SLC 5/04 and MicroLogix 1000.

5.2.6 Function Code #100 - Word Range Write (PLC-5 Command) (Binary Address)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 100	Word Range Write Command.	
9	File Number	PLC-5 file number to be associated with the command. If a value of -1 is entered for the parameter, the field will not be used in the command, and the default file will be used.	P1
10	Element Number	The parameter defines the element in the file where write operation will start. If a value of -1 is entered for the parameter, the field will not be used in the command, and the default element will be used.	P2
11	Sub-Element Number	This parameter defines the sub-element for the command. Refer to the AB documentation for a list of valid sub- element codes. If the value is set to -1, the default sub-element number will be used.	P3
12	Not Used	This field is not used by the command. Values entered in this column will be ignored.	P4

This function writes one or more words of data to a PLC data table. This function should work on the following devices: PLC-5.

5.2.7 Function Code #101 - Word Range Read (PLC-5 Command) (Binary Address)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled and 1=Continuous.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 101	Word Range Write Command.	
9	File Number	PLC-5 file number to be associated with the command. If a value of -1 is entered for the parameter, the field will not be used in the command, and the default file will be used.	P1
10	Element Number	The parameter defines the element in the file where write operation will start. If a value of -1 is entered for the parameter, the field will not be used in the command, and the default element will be used.	P2
11	Sub-Element Number	This parameter defines the sub-element for the command. Refer to the AB documentation for a list of valid sub- element codes. If the value is set to -1, the default sub-element number will be used.	P3
12	Not Used	This field is not used by the command. Values entered in this column will be ignored.	P4

This function reads one or more words of data from a PLC data table. This function should work on the following devices: PLC-5.

5.2.8 Function Code #102 - Read-Modify-Write (PLC-5 Command) (Binary Address)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address for the data to be associated with the command.	
3	Poll Interval	Minimum number of seconds to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: Always zero (0).	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 102	Read-Modify-Write Command.	
9	File Number	PLC-5 file number to be associated with the command. If a value of -1 is entered for the parameter, the field will not be used in the command, and the default file will be used.	P1
10	Element Number	The parameter defines the element in the file where write operation will start. If a value of -1 is entered for the parameter, the field will not be used in the command, and the default element will be used.	P2
11	Sub-Element Number	This parameter defines the sub-element for the command. Refer to the AB documentation for a list of valid sub-element codes. If the value is set to -1, the default sub-element number will be used.	P3
12	Not Used	This field is not used by the command. Values entered in this column will be ignored.	P4

This function writes one or more words of data to a PLC data table. This function should work on the following devices: PLC-5. The command constructed contains an AND mask and an OR mask. Values in the AND mask have the following definitions: 0=Reset and 1=Leave the Same. Values in the OR mask have the following definitions: 0=Leave the Same and 1=Set. The module is responsible for setting the mask values to correctly construct the message from the virtual database values.

5.2.9 Function Code #150 - Word Range Write (PLC-5 Command) (ASCII Address)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 150	Word Range Write Command.	
9	File String	PLC-5 address as specified as an ASCII string. For example, N10:300.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function writes one or more words of data to a PLC data table. This function should work on the following devices: PLC-5.

5.2.10 Function Code #151 - Word Range Read (PLC-5 Command) (ASCII Address)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled and 1=Continuous.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 151	Word Range Read Command.	
9	File String	PLC-5 address as specified as an ASCII string. For example, N10:300.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function reads one or more words of data from a PLC data table. This function should work on the following devices: PLC-5.

5.2.11 Function Code #152 - Read-Modify-Write (PLC-5 Command) (ASCII Address)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address for the data to be associated with the command. The first database register is used as the AND mask for the command, and the second is used for the OR mask. Values in the AND mask have the following definitions: 0=Reset and 1=Leave the Same. Values in the OR mask have the following definitions: 0=Leave the Same and 1=Set.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: Always zero (0).	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 152	Read-Modify-Write Command.	
9	File String	PLC-5 address as specified as an ASCII string. For example, N10:300.	P1
10 to 12	Not Used	These fields are not used by the command. Values entered in these columns will be ignored.	P2 to P4

This function writes one or more words of data to a PLC data table. This function should work on the following devices: PLC-5. The command constructed contains an AND mask and an OR mask. Values in the AND mask have the following definitions: 0=Reset and 1=Leave the Same. Values in the OR mask have the following definitions: 0=Leave the Same and 1=Set. The module is responsible for setting the mask values to correctly construct the message from the virtual database values.

5.2.12 Function Code #501 - Protected Typed Logical Read (Two Address Fields)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled and 1=Continuous.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum number of seconds to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 501	Logical Read Command	
9	File Type	SLC file type letter as used in file name string. Valid values for the system are N, S, F, A, ….	P1
10	File Number	SLC file number to be associated with the command.	P2
11	Element Number	The parameter defines the element in the file where write operation will start.	P3
12	Not Used	This field is not used by the command. Values entered in this column will be ignored.	P4

This function reads one or more words of data from a PLC data table.

5.2.13 Function Code #502 - Protected Typed Logical Read (Three Address Fields)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled and 1=Continuous.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum number of seconds to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 502	Logical Read Command	
9	File Type	SLC file type letter as used in file name string. Valid values for the system are N, S, F, A, ….	P1
10	File Number	SLC file number to be associated with the command.	P2
11	Element Number	The parameter defines the element in the file where write operation will start.	P3
12	Sub-Element Number	This parameter defines the sub-element for the command. Refer to the AB documentation for a list of valid sub-element codes.	P4

This function reads one or more words of data from a PLC data table. This function should work on the following devices: SLC 500, SLC 5/03 and SLC 5/04.

5.2.14 Function Code #509 - Protected Typed Logical Write (Two Address Fields)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 509	Logical Write Command	
9	File Type	SLC file type letter as used in file name string. Valid values for the system are N, S, F, A, ….	P1
10	File Number	SLC file number to be associated with the command.	P2
11	Element Number	The parameter defines the element in the file where write operation will start.	P3
12	Not Used	This field is not used by the command. Values entered in this column will be ignored.	P4

This function writes one or more words of data to a PLC data table.

5.2.15 Function Code #510 - Protected Typed Logical Write (Three Address Fields)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the first data point to be associated with the command.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: 0=None, 1=Swap words, 2=Swap words & bytes and 3=swap bytes in each word.	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 510	Logical Write Command	
9	File Type	SLC file type letter as used in file name string. Valid values for the system are N, S, F, A, ….	P1
10	File Number	SLC file number to be associated with the command.	P2
11	Element Number	The parameter defines the element in the file where write operation will start.	P3
12	Sub-Element Number	This parameter defines the sub-element for the command. Refer to the AB documentation for a list of valid sub-element codes.	P4

This function writes one or more words of data to a PLC data table. This function should work on the following devices: SLC 500, SLC 5/03 and SLC 5/04.

5.2.16 Function Code #511 - Protected Typed Logical Write with Mask (Three Address Fields)

Column	Parameter	Description	Parameter
1	Enable/Type Word	0=Disabled, 1=Continuous and 2=Conditional.	
2	Virtual Database Address	This parameter defines the database address of the data to be associated with the command. The first word of data contains the bit mask and the second word contains the data.	
3	Poll Interval	Minimum time in tenths of a second to wait before polling with this command.	
4	Count	Number of data word values to be considered by the function.	
5	Swap Type Code	Swap type code for command: Always zero (0).	
6	Node Address	Address of unit to reach on the data highway.	
7	Slot Number	Processor slot number in Control/CompactLogix rack. Use -1 for PLC5 & SLC processors.	
8	Function Code = 511	Logical Write with mask	
9	File Type	SLC file type letter as used in file name string. Valid values for the system are N, S, F, A, ….	P1
10	File Number	SLC file number to be associated with the command.	P2
11	Element Number	The parameter defines the element in the file where write operation will start.	P3
12	Sub-Element Number	This parameter defines the sub-element for the command. Refer to the AB documentation for a list of valid sub-element codes.	P4

This function writes one or more words of data from a PLC data table controlling individual bits in the table. The bit mask used for the command is 0xFFFF. This provides direct manipulation of the data in the device with the internal data of the module. The function requires that all data associated with the command use the same mask.

5.3 PLC-5 Processor Specifics

This section contains information specific to the PLC-5 processor with relation to the DF1 command set. The commands specific to the PLC-5 processor contain a sub-element code field. This field selects a sub-element field in a complex data table. For example, to obtain the current accumulated value for a counter or timer, the sub-element field should be set to 2. The tables below show the sub-element codes for PLC-5 complex data tables.

5.3.1 PLC-5 Sub-Element Codes

Timer / Counter

Code	Description
0	Control
1	Preset
2	Accumulated

Control

Code	Description
0	Control
1	Length
2	Position

*PD**

Code	Description
0	Control
2	SP
4	Kp
6	Ki
8	Kd
26	PV

*All PD values are floating point values, so they are two words long.

BT

Code	Description
0	Control
1	RLEN
2	DLEN
3	Data file #
4	Element #
5	Rack/Grp/Slot

MG

Code	Description
0	Control
1	Error
2	RLEN
3	DLEN

5.4 SLC Processor Specifics

This section contains information specific to the SLC processor based family when used with the DF1 command set. The SLC processor commands support a file type field entered as a single character to denote the data table to interface with in the command. The following table defines the relationship of the file types accepted by the module and the SLC file types:

5.4.1 SLC File Types

File Type	Description
S	Status
B	Bit
T	Timer
C	Counter
R	Control
N	Integer
F	Floating-point
Z	String
A	ASCII

The File Type Command Code is the ASCII character code value of the File Type letter. This is the value to enter into the "File Type" parameter of the DF1 Command configurations in the data tables in the ladder logic.

Additionally, the SLC specific functions (502, 510 and 511) support a sub-element field. This field selects a sub-element field in a complex data table. For example, to obtain the current accumulated value for a counter or timer, the sub-element field should be set to 2.

5.5 MicroLogix Processor Specifics

This section contains information specific to the MicroLogix processor based family when used with the DF1 command set. The MicroLogix processor commands support a file type field entered as a single character to denote the data table to interface with in the command. This field is the same as that used for a SLC processor. The following table defines the relationship of the file types accepted by the module and the SLC file types:

5.5.1 SLC File Types

File Type	Description
S	Status
B	Bit
T	Timer
C	Counter
R	Control
N	Integer
F	Floating-point
Z	String
A	ASCII

The File Type Command Code is the ASCII character code value of the File Type letter. This is the value to enter into the "File Type" parameter of the DF1 Command configurations in the data tables in the ladder logic.

Additionally, the SLC specific functions (502, 510 and 511) support a sub-element field. This field selects a sub-element field in a complex data table. For example, to obtain the current accumulated value for a counter or timer, the sub-element field should be set to 2.

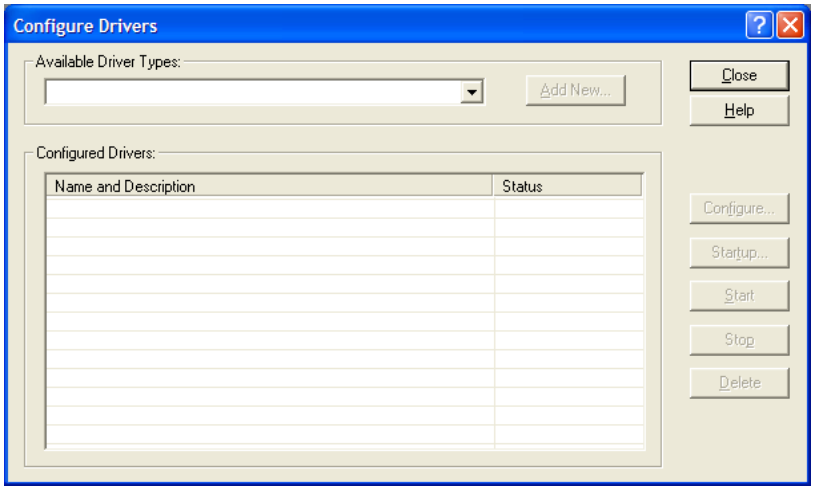
5.6 ControlLogix Processor Specifics

This section contains information specific to the ControlLogix processor when used with the DF1 command set. The current implementation of the DF1 command set does not use functions that can directly interface with the ControlLogix Tag Database. In order to interface with this database, the table-mapping feature provided by RSLogix 5000 must be used. The software permits the assignment of ControlLogix Tag Arrays to virtual PLC 5 data tables. The ProSoft module using the PLC 5 command set defined in this document can then reach this controller data.

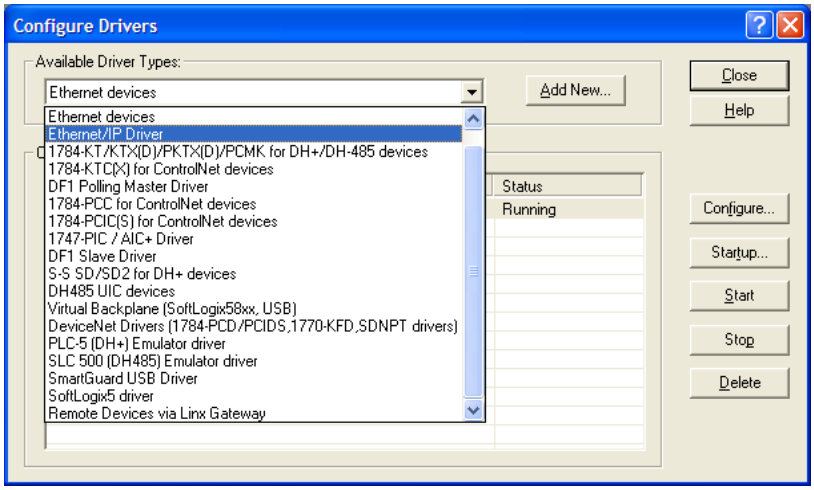
5.7 RSLinx Software

RSLinx is used by many personal computer-based applications to interface with Rockwell Automation products. For example, RSView requires the use of RSLinx for communication to remote nodes on a network. The following procedure is recommended for accessing the DFNT database using RSLinx version 2.54, or higher.

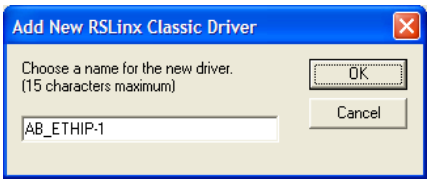
1. Start RSLinx software.
2. Open the **COMMUNICATIONS** menu, and then select **CONFIGURE DRIVERS**. This action opens the **CONFIGURE DRIVERS** dialog box.



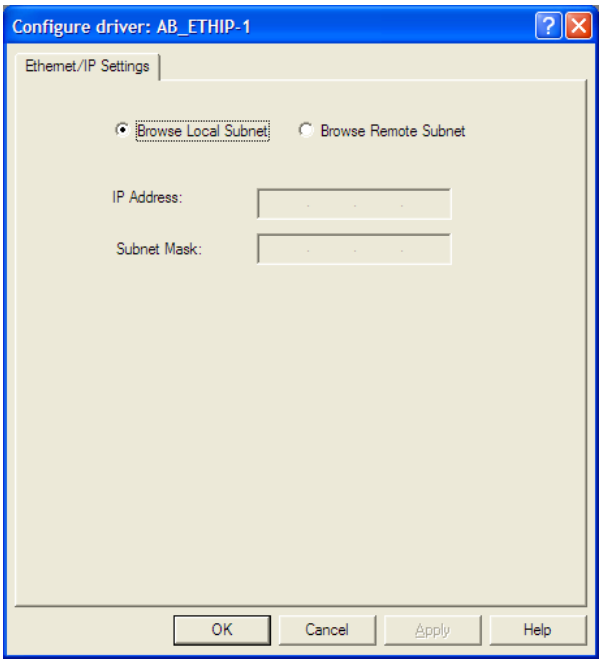
3. Click the arrow to the right of the Available Driver Types field, and then select **ETHERNET/IP DRIVER** from the dropdown list.



4 Click the **ADD/NEW** button, and then click **OK** in the **ADD NEW RSLINX DRIVER** dialog box.

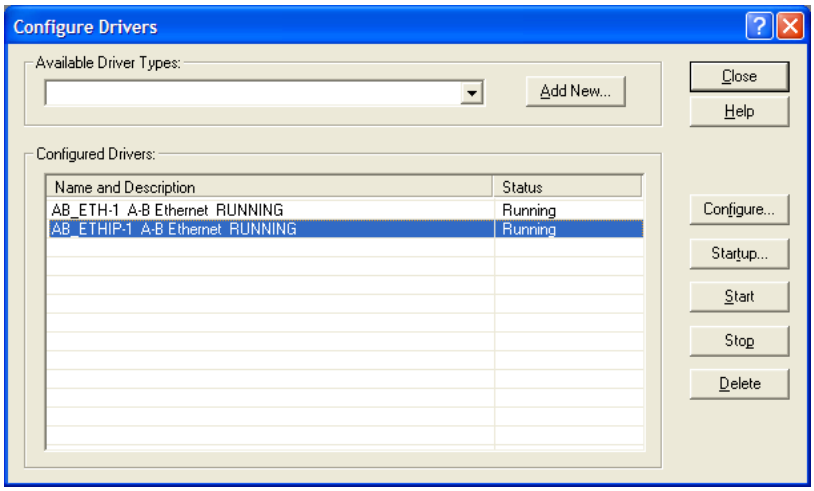


5 In the **CONFIGURE DRIVER** dialog box, make sure the Browse Local Subnet item is selected.



6 Make sure the **BROWSE LOCAL SUBNET** item is selected. RSLinx software will browse your local subnet and retrieve the IP address.

7 Click **OK** to save your settings and dismiss the **CONFIGURE DRIVER** dialog box. The new driver will appear in the list of configured drivers.

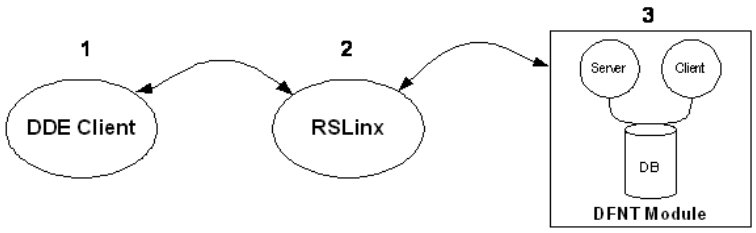


8 Close RSLinx software.

5.7.1 DDE Connection

This section discusses setting up a DDE connection to the module in order to transfer data between the module and a DDE compliant application.

Each DDE connection requires three basic elements: Application, Topic and Item. These three properties of a DDE link define the program providing the connection, the topic to connect to and the item in the topic that you wish to interface. All three are required for a connection. For this discussion, the Application will always be RSLinx. The Topic is defined in the RSLinx OEM release software and the Item is defined in the DDE client application where the data is required. The link between the DDE server and the DDE client can be established after these parameters are defined. The following illustration shows the relationship of these elements and the facilities used in the DDE link.



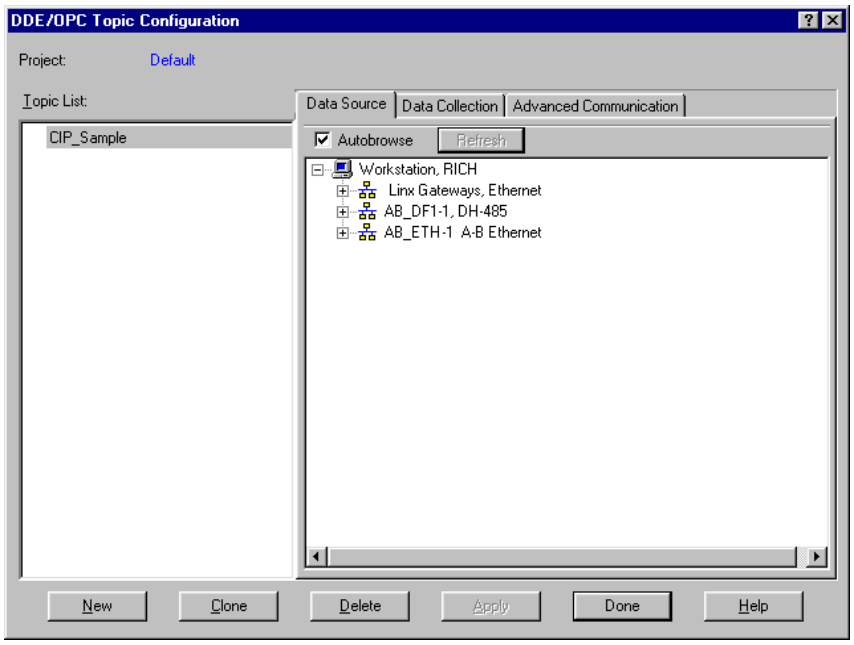
1 The DDE Client application specifies the DDE link by specifying the APPLICATION, TOPIC, and ITEM elements. For example, in Excel, enter =RSLINX|CIP_Sample! 'ReadData[0]' into a cell.

2 RSLinx is the DDE Server: APPLICATION = RSLINX.

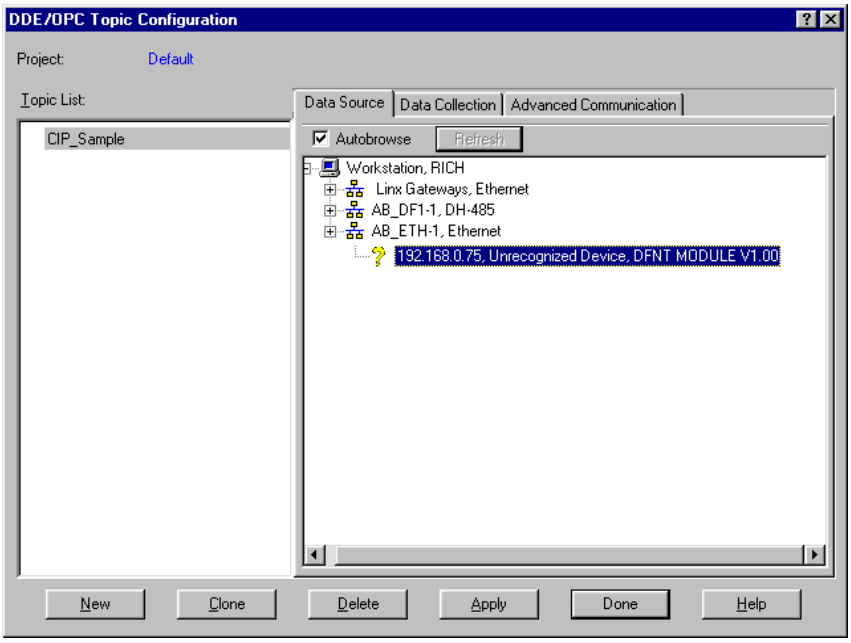
And
RSLinx defines the TOPIC.
This is the communication link to the DFNT module. In this example, a DDE TOPIC is called "CIP_Sample" for the communication link to the DFNT module.

3 The DFNT module is used to serve data to RSLinx using the EtherNet/IP driver with explicit messaging. Database is accessed using tag names (e.g. ReadData[0]).

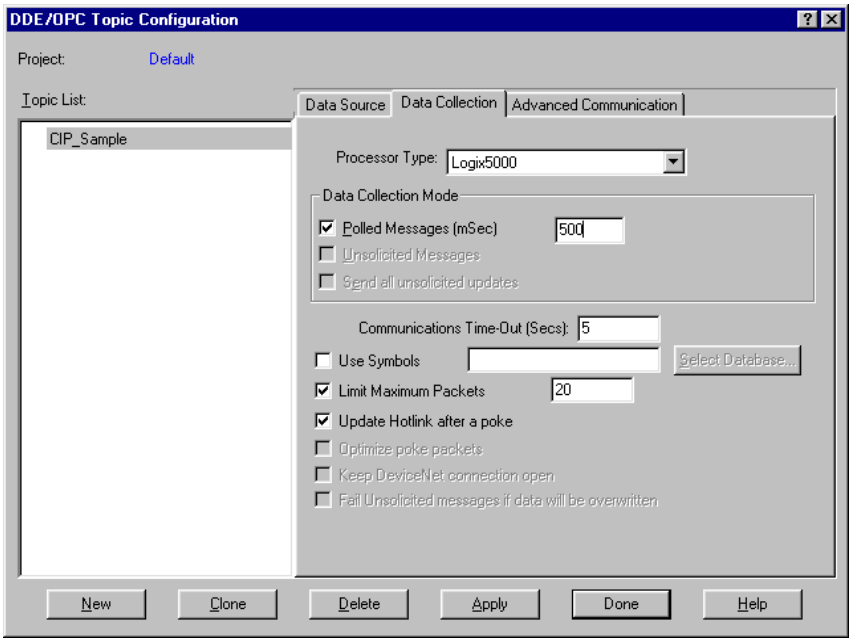
As discussed in the previous section, RSLinx must be used to define the Topic element for the DDE link definition. This is accomplished using the following procedure. It is assumed that the module can be seen in the RSLinx software. Refer to the RSLinx section of this manual to set up this connection. To define a new Topic, select the **TOPIC CONFIGURATION** option on the **DDE/OPC** menu from the RSLinx Main Menu. This causes the following dialog box to appear:



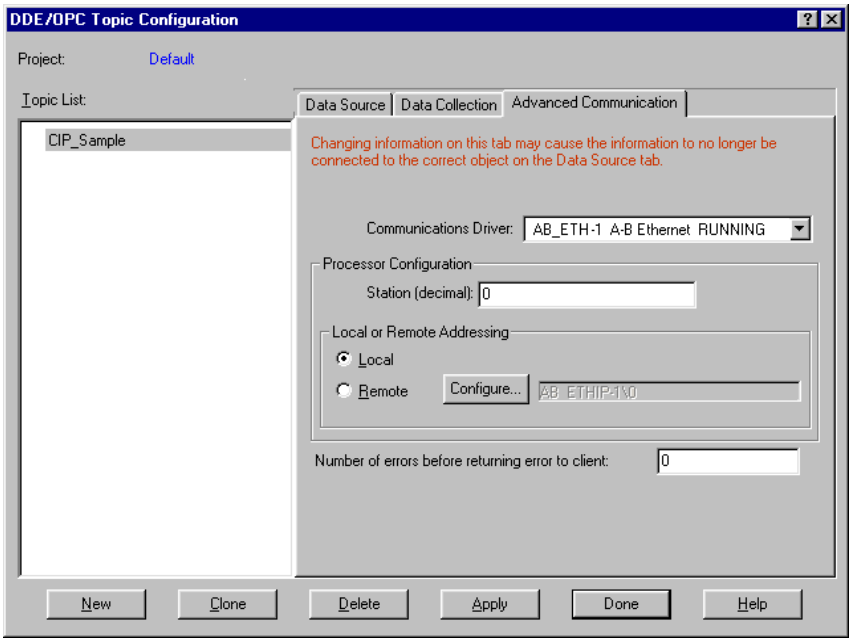
Click the **NEW** button to add a new Topic to the **TOPIC LIST**. This displays a default name. Edit the Topic name for the link to be formed. This name should reflect the unit or location to which the connection is being made. Do not press the Enter key. Instead, double-click the mouse on the DFNT device you want to connect to the entered Topic name. The dialog should now appear as follows:



Now select the **DATA COLLECTION** tab on the dialog box. Fill in the form to define the characteristics of the DDE link. The following screen shows an example:



You must set the **PROCESSOR TYPE** to Logix5000. Refer to the RSLinx on-line help for a discussion of each of the parameters on the form. Next select the **ADVANCED COMMUNICATION** tab on the dialog box. The following is displayed after selecting the tab.



The **COMMUNICATION DRIVER** should be set to the ETHIP driver. Make sure the **LOCAL** option is selected in the **LOCAL OR REMOTE ADDRESSING** section of the dialog box. You should not have to alter any data on this tab, as RSLinx knows the communication path. Now click the **APPLY** button to implement the options and to establish the topic.

You are now ready to use the DDE link in a DDE client application. The following example shows how to define a DDE link in an Excel Spreadsheet. It is also possible to define a DDE link in a Visual Basic program. Any other Windows DDE client application could be used including SoftLogix and RSSql.

Defining a DDE link in Excel

This is the simplest DDE link to define and should be used to make sure the Topic is defined correctly before using more advanced applications. Before attempting to make the link, verify that RSLinx is running and that the DFNT module is seen. To make a DDE link in Excel, enter the application, topic and item elements as a formula into a cell. The format for the formula is as follows:

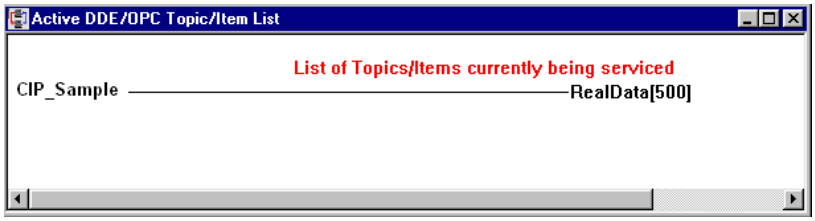
```
=APPLICATION|TOPIC!ITEM
```

The "**|**" character (piping symbol) separates the application and topic fields and the "**!**" (exclamation symbol) separates the topic and item fields. For our example topic of ProLinx1, the entry into the cell is:

```
=RSLinx|CIP_Sample!'RealData[500]'
```

This causes the current value at the database double-word offset 500 (starting at word address 1000) in the DFNT module to be displayed in the cell as a floating-point value. This value updates at the frequency defined in the Topic configuration in RSLinx. You can now place any database point in the DFNT module using the same procedure in your work sheet. Note that the tag array name is used for the item property and must be enclosed within the quote marks. This is because the tag array name item reference looks like an Excel work sheet reference. If you do not include the quotes, a formula error occurs. You can select any of the defined tag array names defined in the module on your spreadsheet.

When the items are used for the topic, RSLinx displays the following after selecting the Active Topic/Items command on the DDE/OPC menu option:

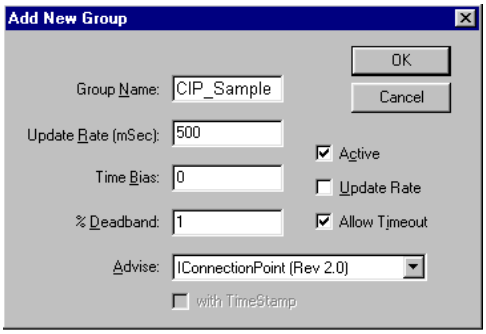


Any DDE compliant program can be used in the same manner. For maximum utility Visual Basic applications can be used to interface with module's database using DDE connectivity.

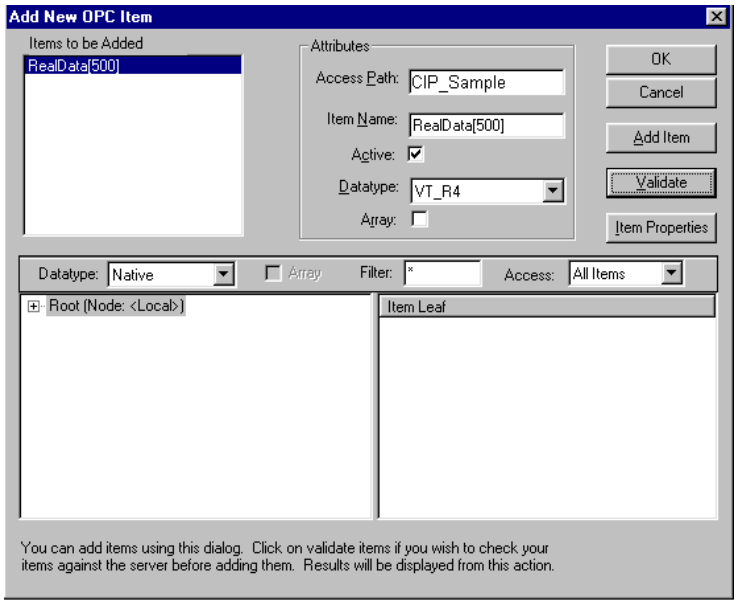
5.7.2 OPC Connection

This section discusses setting up an OPC connection to the module in order to transfer data between the module and an OPC compliant client. Follow the instructions for setting up the DDE connection outlined in the previous section. This will define the connection required by the OPC server. RSLinx will now be configured to interface with an OPC client application.

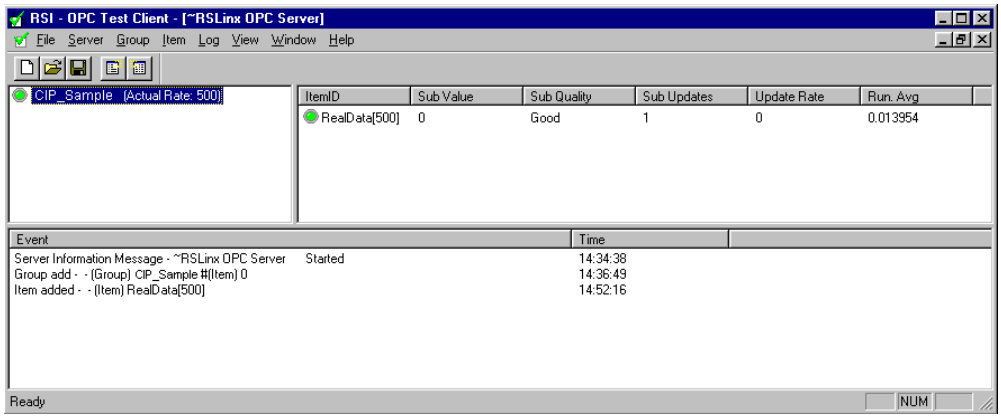
The example used in this section uses the OPC test client (opctest.exe) available from Rockwell Automation. First start the application and select the Connect… option from the Server Menu. In the dialog box shown, select the RSLinx OPC server. Next add a group using the Group menu option and fill in the Group Name using any name that is meaningful for the points to be monitored and controlled. The following dialog displays an example:



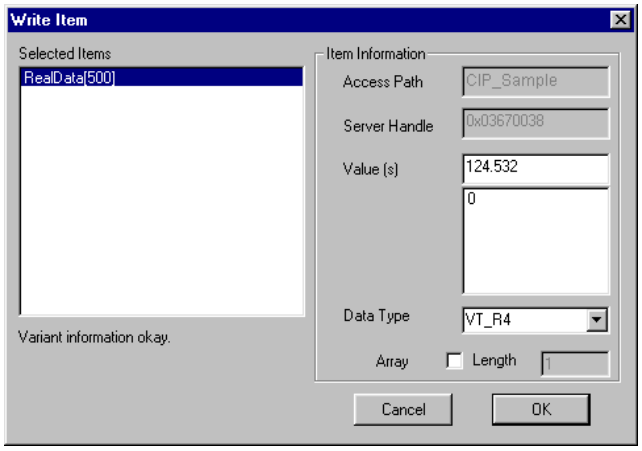
Next, add items to the client. The following shows an example dialog used to add a floating-point data item:



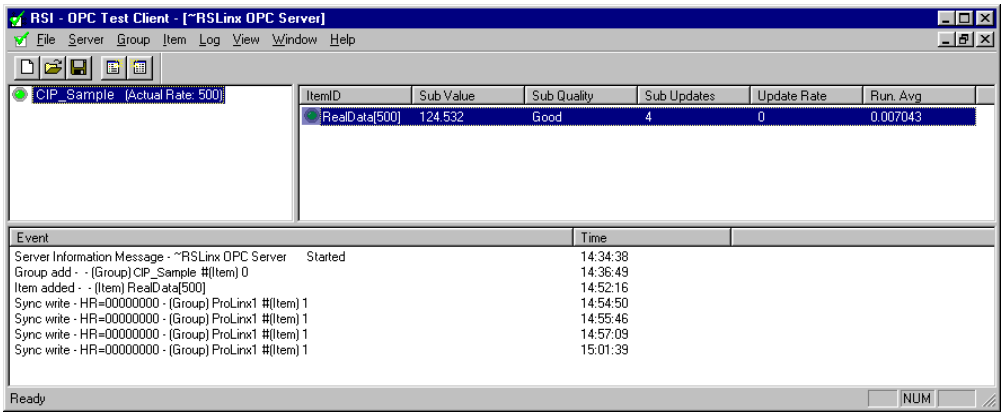
It is important to set the Access Path value to the Topic name assigned in RSLinx and to set the Item Name to a valid controller tag in the DFNT module. The Datatype parameter must be set to match that of the controller tag. In the example shown, the VT_R4 data type is selected for the floating-point tag. The Validate button can be used to verify that the point is valid in the OPC server. After configuring the new data item, click OK to add the point. The following illustration shows the new item and event windows.



You have now connected an OPC client to data in the DFNT module. In order to change the value for the item, select the Sync Write option from the Item menu and enter a new value as shown in the following dialog box:



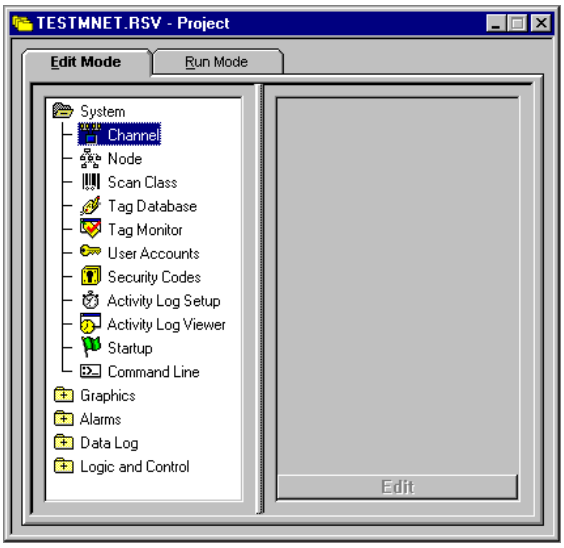
Click **OK** to transfer the new value to the module. The following illustration shows the updated item data window.



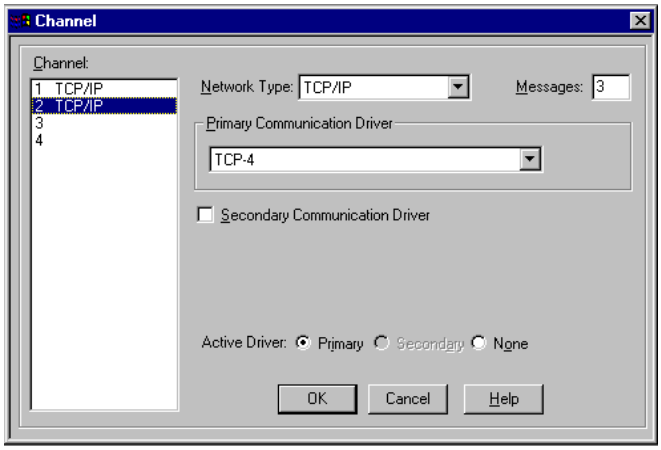
5.8 RSView Software

RSView is a client application for building user interfaces to control systems. This tool requires RSLinx to be loaded and operational (refer to the RSLinx section of this document). In order to interface RSView to a DFNT module, the following steps are required:

First select the **CHANNEL** option from the **EDIT MODE** tab as shown in the following window.

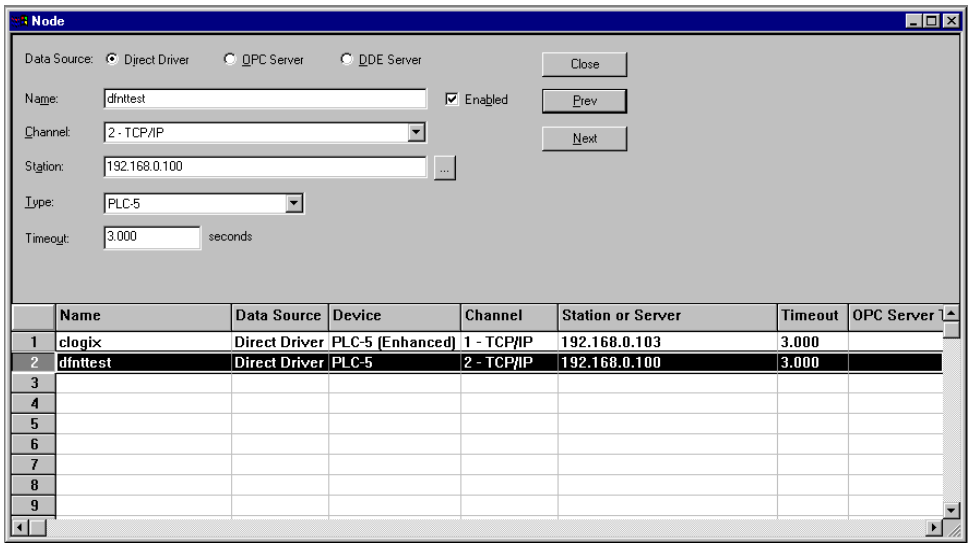


After selecting the option, the following dialog box is displayed:



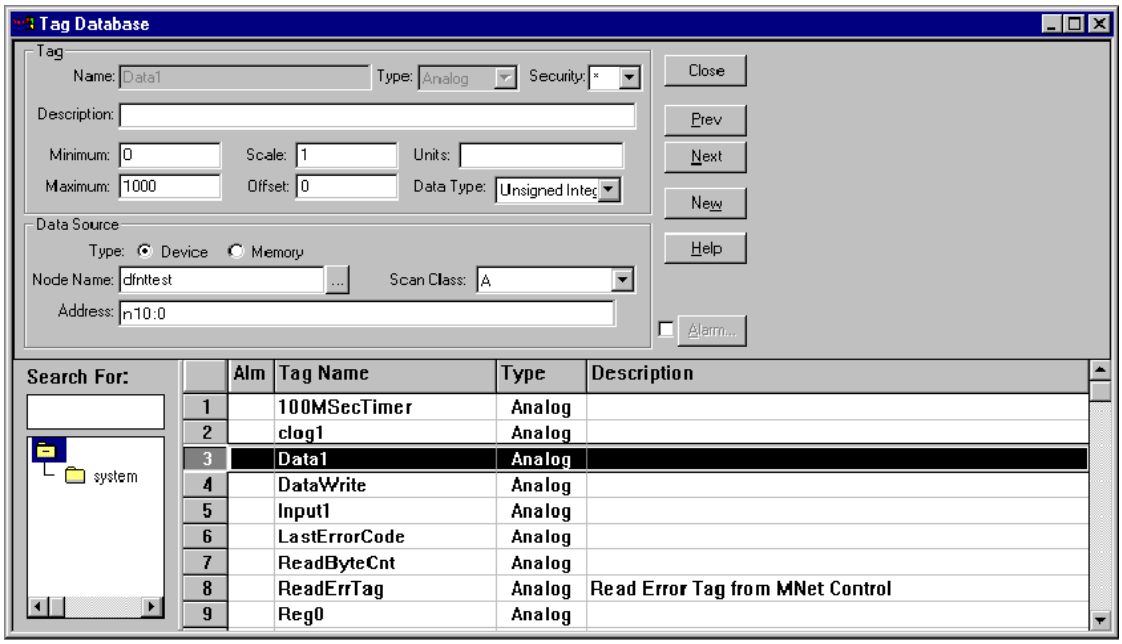
Select the **NETWORK TYPE** and **PRIMARY COMMUNICATION DRIVER** for the channel to be associated with the DFNT module. The **NETWORK TYPE** should be TCP/IP and the **PRIMARY COMMUNICATION DRIVER** name should match that set up in RSLinx. Click OK to save the information.

Next select the **NODE** option from the **EDIT MODE** tab. After selecting the option, the following dialog box is displayed:



Enter a record in the dialog box for the DFNT module to be addressed. The **NAME** field identifies the module to the RSView system. The **CHANNEL** parameter should be that defined in the channel set up defined above. The **STATION** parameter should be set to the IP address of the DFNT module. Select the **CLOSE** button after completing the node entry. If your version of the RSView supports ControlLogix controller tag read and write operations, select the device type consistent with the ControlLogix processor. This will permit direct access to the controller tags simulated in the module. Use of controller tags simplifies handling of the data in RSView as the data will be passing in the correct data format (that is, bit, word, float).

Next select the **TAG DATABASE** option from the **EDIT MODE** tab. After selecting the option, the following dialog box is displayed:



Set up tags for each element to be transferred between RSView and the DFNT module. In the example above, **DATA1** is associated with the first element in the DFNT module's database (N10:0). A tag should be setup for each register in the module's database to be interfaced. If RSView is set in run mode, values for the tags should match those in the module's database. Use the module controller tag names if using CIP data table read and write operations.

Refer to the RSView documentation for a full discussion of database tags and reading and writing data between RSView and a processor.

5.9 ControlLogix (CLX) Processor

In order to exchange data between a ControlLogix processor and the module, the MSG instruction is used. There are two basic methods of data transfer supported by the module when using the MSG instruction: Encapsulated PCCC messages and CIP Data Table messages. Either method can be used, and the selection is left to the application developer.

5.9.1 Encapsulated PCCC Messages

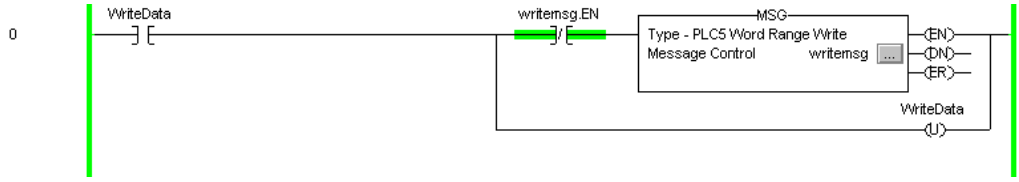
PLC5 and SLC5/05 processors containing an Ethernet interface use the encapsulated PCCC message method. The module simulates these devices and accepts both read and write commands. The following topics describe the support for the read and write operations.

Encapsulated PCCC Write Message

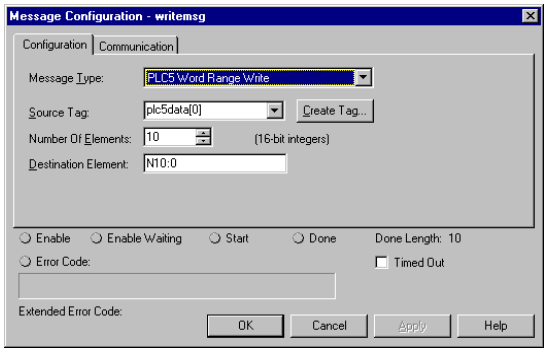
Write commands transfer data from the ControlLogix processor to the module. The following encapsulated PCCC commands are supported from a ControlLogix Processor:

- PLC2 Unprotected Write
- PLC5 Typed Write
- PLC5 Word Range Write
- PLC Typed Write

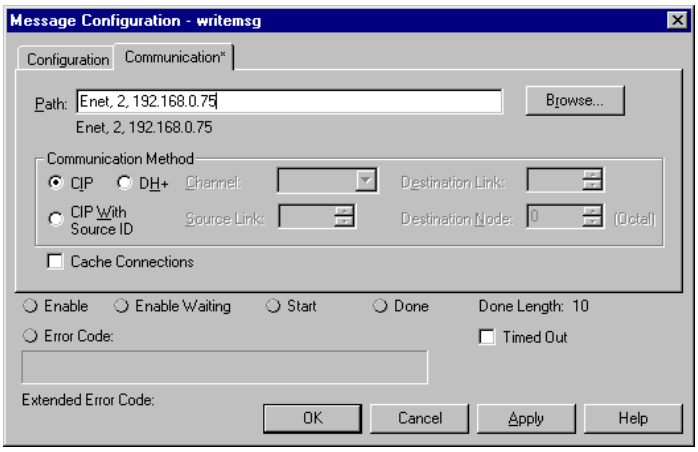
An example rung used to execute a write command is shown in the following diagram:



The **MESSAGE CONFIGURATION** dialog box must be completed to define the data set to be transferred from the processor to the module. An example of the dialog box follows:



Complete the dialog box for the data area to be transferred. For PLC5 and SLC messages, the **DESTINATION ELEMENT** should be an element in a data file (such as, N10:0). For the PLC2 Unprotected Write message, the **DESTINATION ELEMENT** is the address in the module's internal database and cannot be set to a value less than ten. This is not a limitation of the module but of the RSLogix software. For a PLC2 unprotected write or read function, the database address should be entered in octal format. Additionally, the **COMMUNICATION** information must also be configured. The following is an example of the dialog box.



Verify that the **CIP** radio-button is selected as the **COMMUNICATION METHOD**. The **PATH** specifies the message route from the ControlLogix processor to the DFNT module. Path elements are separated by commas. In the example path shown, the first element is "Enet", which is the user-defined name given to the 1756-ENET module in the chassis (you could substitute the slot number of the ENET module for the name), the second element, "2", represents the Ethernet port on the 1756-ENET module, and the last element of the path, "192.168.0.75", is the IP address of the DFNT module, the target for the message.

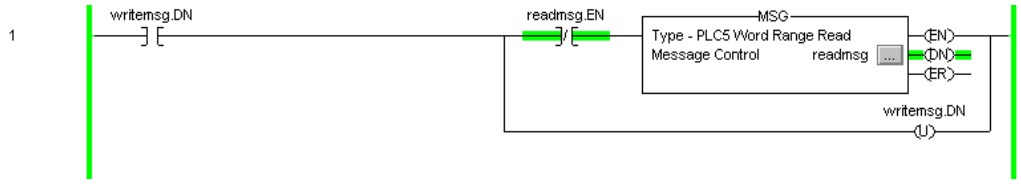
More complex paths are possible if routing to other networks using multiple 1756-ENET modules and racks. Refer to the Rockwell Automation Support Knowledgebase for more information on Ethernet routing and path definitions.

Encapsulated PCCC Read Message

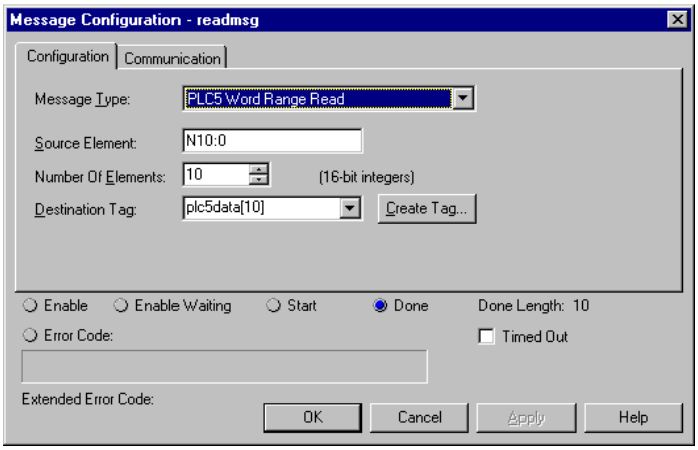
Read commands transfer data from the module to a ControlLogix processor. The following encapsulated PCCC commands are supported from a ControlLogix Processor:

- PLC2 Unprotected Read
- PLC5 Typed Read
- PLC5 Word Range Read
- PLC Typed Read

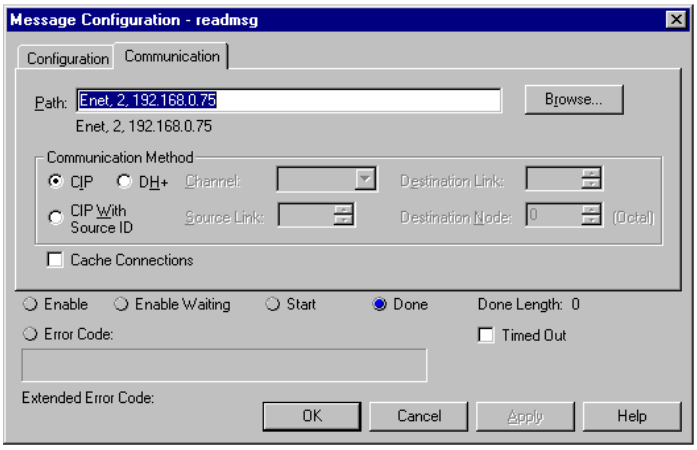
An example rung used to execute a read command is shown in the following diagram:



The **MESSAGE CONFIGURATION** dialog box must be completed to define the data set to transfer to the processor from the module. An example of the dialog box follows:



Complete the dialog box for the data area to be transferred. For PLC5 and SLC messages, the **SOURCE ELEMENT** should be an element in a data file (such as, N10:0). For the PLC2 Unprotected Read message, the **SOURCE ELEMENT** is the address in the module's internal database and cannot be set to value less than ten. This is not a limitation of the module but of the RSLogix software. Additionally, the **COMMUNICATION** information must also be configured. An example of the dialog box follows:



Verify that the **CIP** radio-button is selected as the **COMMUNICATION METHOD**. The **PATH** specifies the message route from the ControlLogix processor to the DFNT module. Path elements are separated by commas. In the example path shown, the first element is "Enet", which is the user-defined name given to the 1756-ENET module in the chassis (you could substitute the slot number of the ENET module for the name), the second element, "2", represents the Ethernet port on the 1756-ENET module, and the last element of the path, "192.168.0.75", is the IP address of the DFNT module, the target for the message.

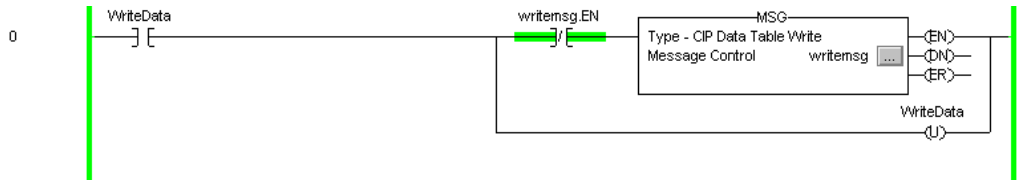
More complex paths are possible if routing to other networks using multiple 1756-ENET modules and racks. Refer to the Rockwell Automation Support Knowledgebase for more information on Ethernet routing and path definitions.

5.9.2 CIP Data Table Operations

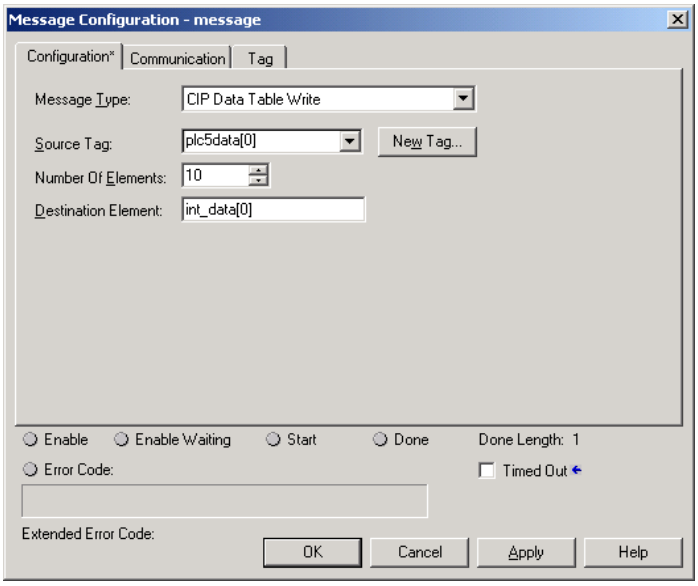
This method of data transfer uses CIP messages to transfer data between the ControlLogix processor and the module. Tag names define the elements to be transferred. The following topics describe the support for the read and write operations.

CIP Data Table Write

CIP data table write messages transfer data from the ControlLogix processor to the DFNT module. An example rung used to execute a write command is shown in the following diagram:



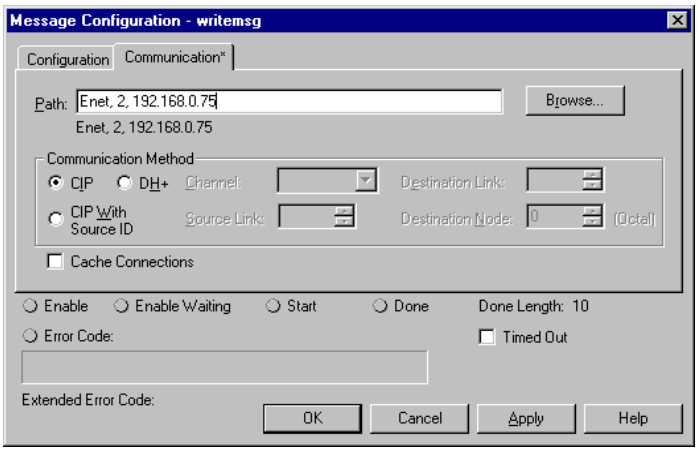
The **MESSAGE CONFIGURATION** dialog box must be completed to define the data set to be transferred from the processor to the module. An example of the dialog box follows:



Complete the dialog box for the data area to be transferred. CIP Data Table messages require a tag database element for both the source and destination. The **SOURCE TAG** is a tag defined in the ControlLogix Tag database. The **DESTINATION ELEMENT** is the tag element in the DFNT module.

The module simulates a tag database as an array of elements defined by the maximum register size for the module (user configuration parameter "Maximum Register" in the [Module] section) with the tag name **INT_DATA.**

In the previous example, the first element in the database is the starting location for the write operation of ten elements. Additionally, the **COMMUNICATION** information must also be configured. An example of the dialog box follows:

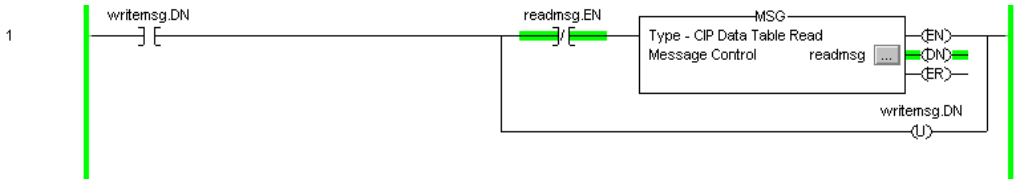


Verify that the **CIP** radio-button is selected as the **COMMUNICATION METHOD**. The **PATH** specifies the message route from the ControlLogix processor to the DFNT module. Path elements are separated by commas. In the example path shown, the first element is "Enet", which is the user-defined name given to the 1756-ENET module in the chassis (you could substitute the slot number of the ENET module for the name), the second element, "2", represents the Ethernet port on the 1756-ENET module, and the last element of the path, "192.168.0.75", is the IP address of the DFNT module, the target for the message.

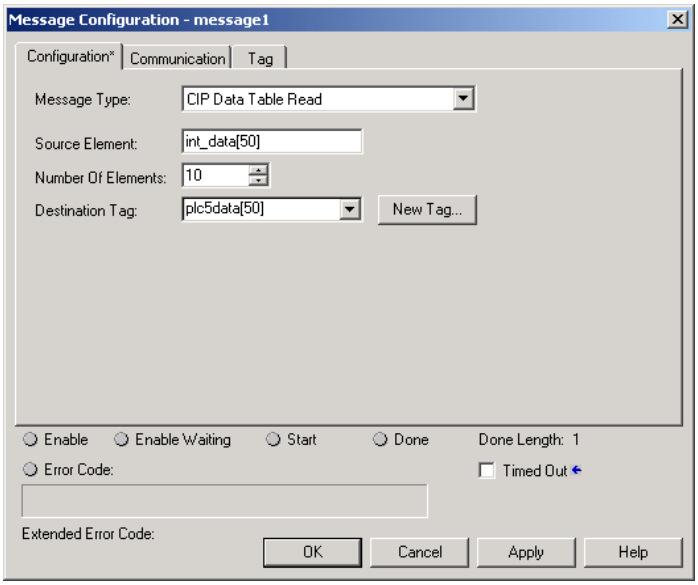
More complex paths are possible if routing to other networks using multiple 1756-ENET modules and racks. Refer to the Rockwell Automation Support Knowledgebase for more information on Ethernet routing and path definitions.

CIP Data Table Read

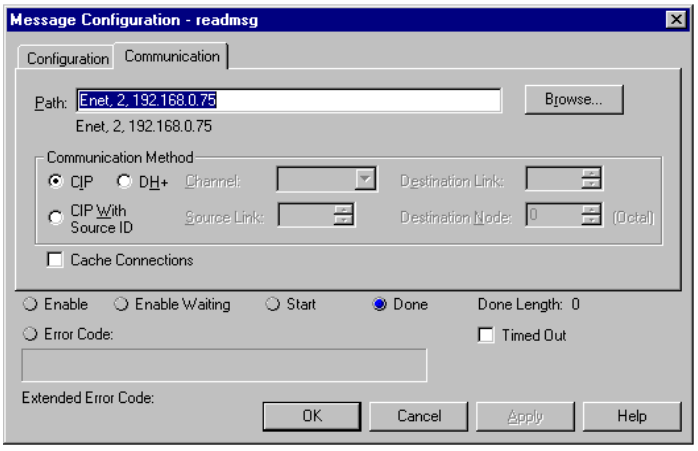
CIP data table read messages transfer data to the ControlLogix processor from the DFNT module. An example rung used to execute a read command is shown:



The **MESSAGE CONFIGURATION** dialog box must be completed to define the data set to transfer to the processor from the module. An example of the dialog box follows:



Complete the dialog box for the data area to be transferred. CIP Data Table messages require a tag database element for both the source and destination. The **DESTINATION TAG** is a tag defined in the ControlLogix Tag database. The **SOURCE ELEMENT** is the tag element in the DFNT module. The module simulates a tag database as an array of elements defined by the maximum register size for the module (user configuration parameter "Maximum Register" in the [Module] section) with the tag name **INT_DATA.** In the example above, the first element in the database is the starting location for the read operation of ten elements. Additionally, the **COMMUNICATION** information must also be configured. An example of the dialog box follows:



Verify that the **CIP** radio-button is selected as the **COMMUNICATION METHOD**. The **PATH** specifies the message route from the ControlLogix processor to the DFNT module. Path elements are separated by commas. In the example path shown, the first element is "Enet", which is the user-defined name given to the 1756-ENET module in the chassis (you could substitute the slot number of the ENET module for the name), the second element, "2", represents the Ethernet port on the 1756-ENET module, and the last element of the path, "192.168.0.75", is the IP address of the DFNT module, the target for the message.

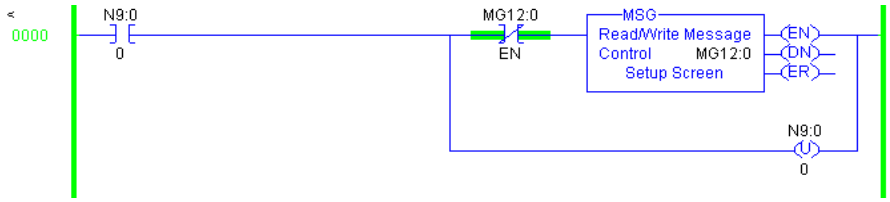
More complex paths are possible if routing to other networks using multiple 1756-ENET modules and racks. Refer to the Rockwell Automation Support Knowledgebase for more information on Ethernet routing and path definitions.

5.10 PLC5 Processor

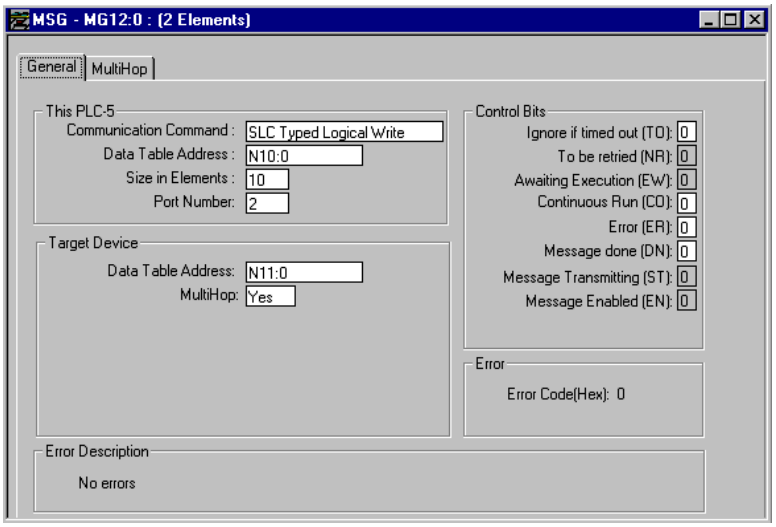
The module can be used to receive messages from a PLC5 containing an Ethernet interface. The module supports both read and write commands. A discussion of each operation is provided in the following topics:

5.10.1 PLC5 Write Commands

Write commands transfer data from the PLC5 processor to the DFNT module. An example rung used to execute a write command is shown in the following diagram:



In order to complete the configuration of the MSG instruction, select the **SETUP SCREEN** area of the MSG object. This displays the following dialog box.

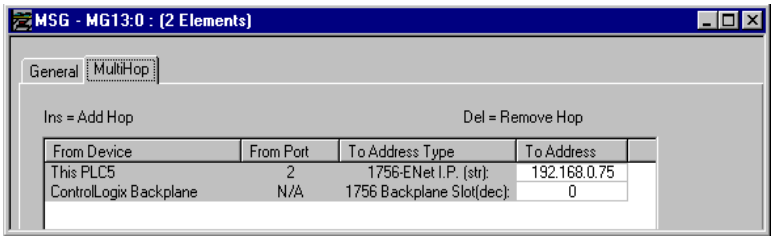


Select the **COMMUNICATION COMMAND** to execute from the following list of supported commands.

- PLC5 Type Write
- PLC2 Unprotected Write
- PLC5 Typed Write to PLC
- PLC Typed Logical Write

The **TARGET DEVICE DATA TABLE ADDRESS** must be set to a valid file element (such as, N11:0) for SLC and PLC5 messages. For the PLC2 Unprotected Write message, set the address to the database index (such as, 1000) to consider with the command.

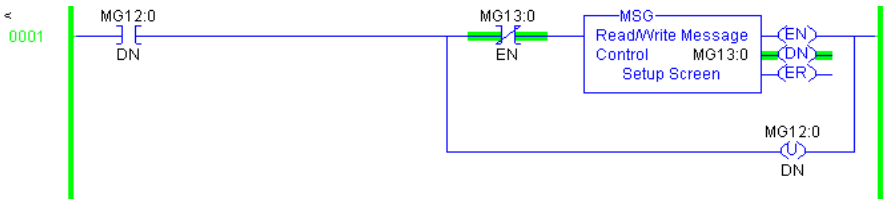
The **MULTIHOP** option must be set to **YES.** The **MULTIHOP** tab portion of the dialog box must be completed as shown in the following window:



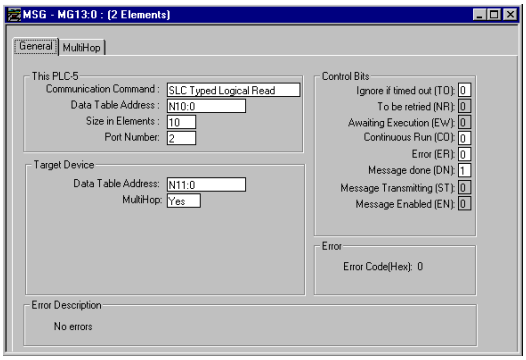
Set the IP address value to the module's Ethernet IP address. You must press the "Insert" key to add the second line for ControlLogix Backplane and set the slot number to zero.

5.10.2 PLC5 Read Commands

Read commands transfer data to the PLC5 processor from the DFNT module. An example rung used to execute a read command is shown in the following diagram:



In order to complete the configuration of the MSG instruction, select the **SETUP SCREEN** area of the MSG object. This displays the following dialog box.

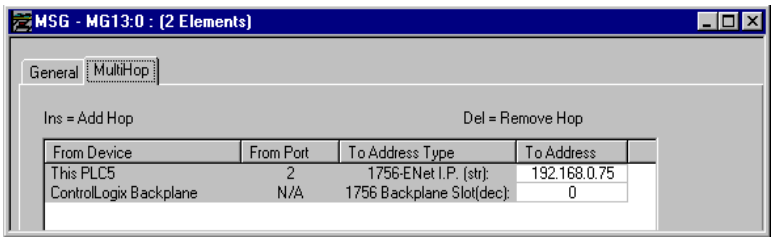


Select the **COMMUNICATION COMMAND** to execute from the following list of supported commands.

- PLC5 Type Read
- PLC2 Unprotected Read
- PLC5 Typed Read to PLC
- PLC Typed Logical Read

The **TARGET DEVICE DATA TABLE ADDRESS** must be set to a valid file element (such as, N11:0) for SLC and PLC5 messages. For the PLC2 Unprotected Read message, set the address to the database index (such as, 1000) to consider with the command.

The **MULTIHOP** option must be set to **YES.** The **MULTIHOP** tab portion of the dialog box must be completed as shown in the following window:



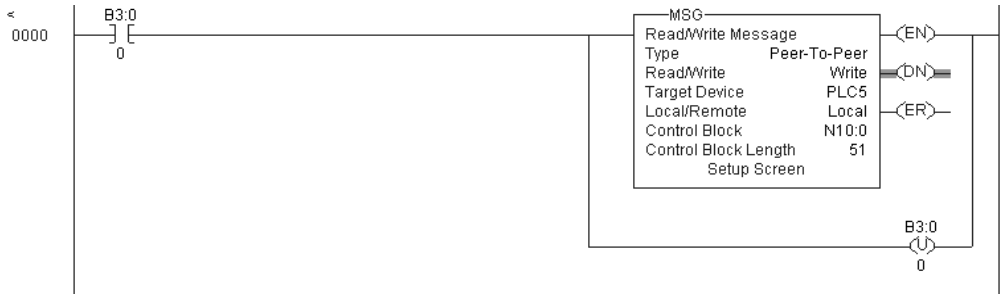
Set the IP address value to the module's Ethernet IP address. You must press the "Insert" key to add the second line for ControlLogix Backplane and set the slot number to zero.

5.11 SLC 5/05 Processor

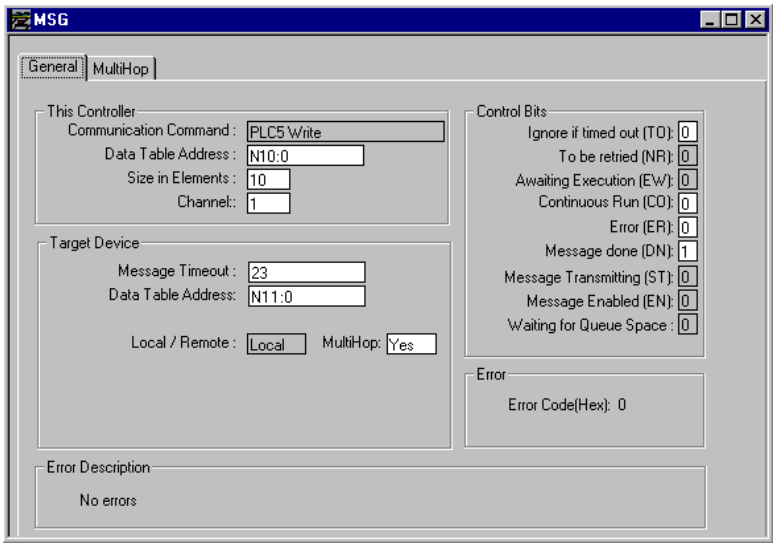
The module can be used to receive messages from a SLC 5/05 containing an Ethernet interface. The module supports both read and write commands. A discussion of each operation is provided in the following topics.

5.11.1 SLC5/05 Write Commands

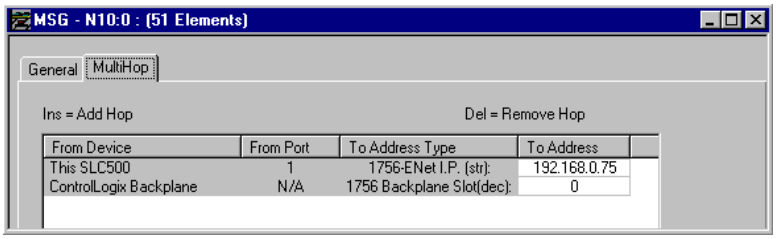
Write commands transfer data from the SLC processor to the DFNT module. An example rung used to execute a write command is shown in the following diagram:



Set the **READ/WRITE** parameter to **WRITE.** The module supports a **TARGET DEVICE** parameter value of **500CPU** or **PLC5.** In order to complete the configuration of the MSG instruction, select the **SETUP SCREEN** area of the MSG object. This displays the following dialog box.



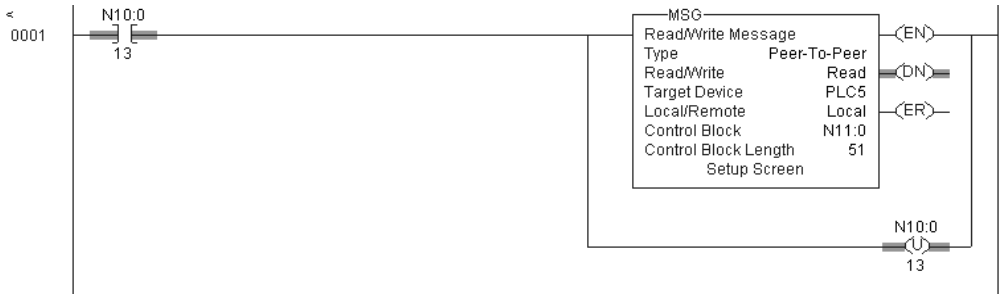
The **TARGET DEVICE DATA TABLE ADDRESS** must be set to a valid file element (such as, N11:0) for SLC and PLC5 messages. The **MULTIHOP** option must be set to **YES.** The **MULTIHOP** tab portion of the dialog box must be completed as displayed in the following window:



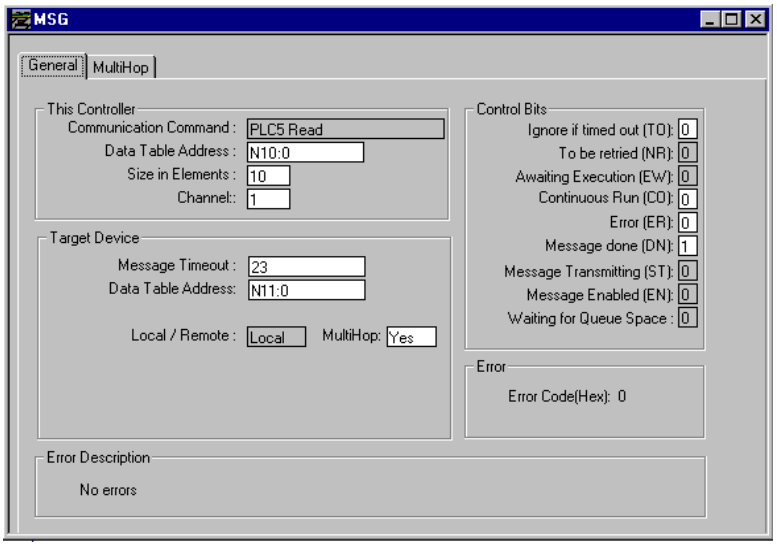
Set the IP address value to the module's Ethernet IP address. You must press the "Insert" key to add the second line for ControlLogix Backplane and set the slot number to zero.

5.11.2 SLC5/05 Read Commands

Read commands transfer data to the SLC processor from the DFNT module. An example rung used to execute a read command is shown in the following diagram:

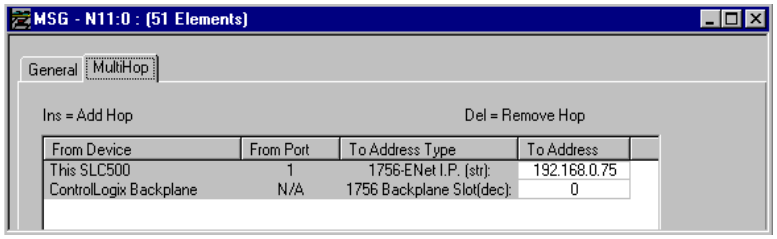


Set the **READ/WRITE** parameter to **READ.** The module supports a **TARGET DEVICE** parameter value of **500CPU** or **PLC5.** In order to complete the configuration of the MSG instruction, select the **SETUP SCREEN** area of the MSG object. This displays the following dialog box.



The **TARGET DEVICE DATA TABLE ADDRESS** must be set to a valid file element (such as, N11:0) for SLC and PLC5 messages. The **MULTIHOP** option must be set to **YES.**

Fill in the **MULTIHOP** tab portion of the dialog box as shown in the following illustration.



Set the IP address value to the module's Ethernet IP address. You must press the "Insert" key to add the second line for ControlLogix Backplane and set the slot number to zero.

5.12 DFNT Command Entry Form

The following form can be used to design the application's command list:

Module Information Data						Device Information Data						
Column #	1	2	3	4	5	6	7	8	9	10	11	12
Function Code	Enable Code	Internal Address	Poll Interval Time	Count	Swap Code	IP Address	Slot Number	Function Code	Function Parameters			

IP Address = IP address of processor to reach
Slot Number = -1 for PLC5 & SLC, processor slot number of ControlLogix

6 Support, Service & Warranty

In This Chapter

Contacting Technical Support

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

1. Product Version Number
2. System architecture
3. Network details

If the issue is hardware related, we will also need information regarding:

1. Module configuration and associated ladder files, if any
2. Module operation and any unusual behavior
3. Configuration/Debug status information
4. LED patterns
5. Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: *For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers.*

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6.1 Warranty Information

For complete details regarding ProSoft Technology's TERMS & CONDITIONS OF SALE, WARRANTY, SUPPORT, SERVICE AND RETURN MATERIAL AUTHORIZATION INSTRUCTIONS please see the documents on the Product CD/DVD or go to www.prosoft-technology/warranty

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Index