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PLX51-DF1-ENI

DF1 to EtherNet/IP™ Router

October 15, 2026

USER MANUAL

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PLX51-DF1-ENI User Manual
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October 15, 2026

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Agency Approvals and Certifications

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1 Preface

1.1 About the PLX51-DF1-ENI

This manual describes the installation, operation, and diagnostics of the PLX51-DF1-ENI. The PLX51-DF1-ENI provides intelligent data routing between EtherNet/IP™ and DF1 which can help simplify the migration from PLC2, PLC3, PLC5, and SLC systems to ControlLogix® or CompactLogix™ platforms, where a DF1 interface is required.

The module can also be used for remote programming, bridging between EtherNet/IP and DF1.

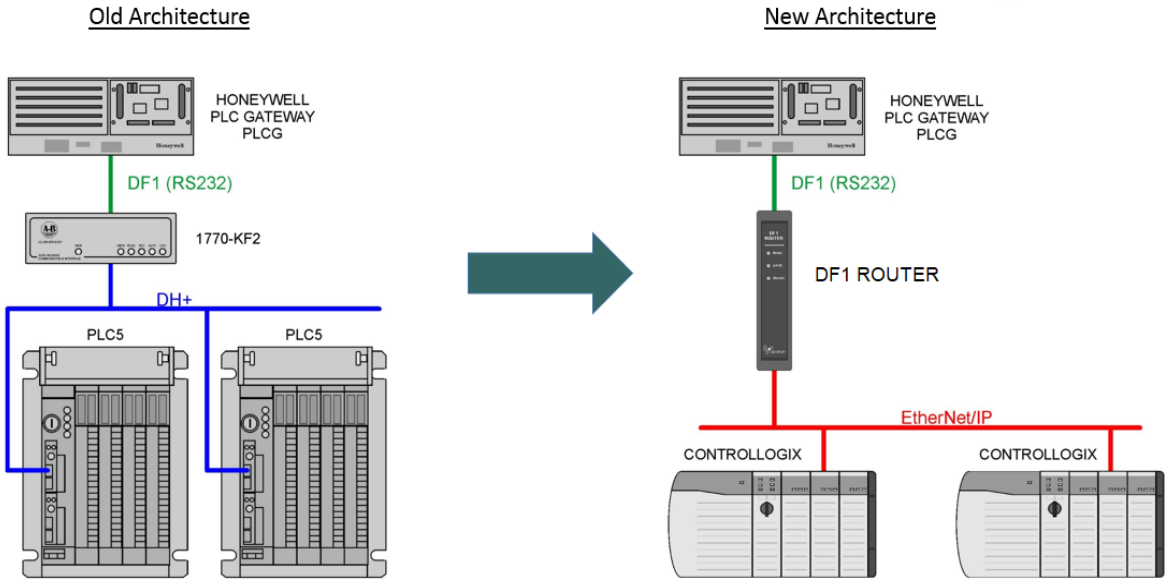


Figure 1.1 - Migration Path

1.2 Features

The PLX51-DF1-ENI is able to transfer data from a DF1 device to a maximum of eight Logix controllers. The module operates in one of four modes, simplifying the configuration for all applications.

Mode	Description	Message Initiator
Bridge	The PLX51-DF1-ENI redirects DF1 PCCC messages to a Logix controller at a preconfigured EtherNet/IP path. Logix PLC Mapping configuration may also be required. This mode also supports remote programming using RSLogix 5 / 500.	Remote Device
DF1 Slave	The PLX51-DF1-ENI will convert DF1 PCCC messages to Logix controller tag reads or tag writes. No Logix PLC Mapping configuration is required.	Remote Device
Scheduled Tag	The PLX51-DF1-ENI transfers data between a DF1 device and several Logix tags, using a preconfigured schedule. No Logix or remote device configuration is required.	PLX51-DF1-ENI
Unscheduled	The PLX51-DF1-ENI transfers messages received from a Logix Message Instruction.	Logix (Msg)

Table 1.1 – Modes of Operation

The PLX51-DF1-ENI is configured using the ProSoft PLX50 Configuration Utility. This program can be downloaded from www.prosoft-technology.com free of charge. The PLX50 Configuration Utility offers various configuration methods, including a controller tag browser.

Hereafter the PLX51-DF1-ENI will be referred to as the **module**.

The module can operate in both a Logix “owned” and standalone mode. With a Logix connection, the input and output assemblies will provide additional diagnostics information which will be available in the Logix controller environment.

The module uses isolated RS232 for DF1 communication providing better noise immunity. The RS232 port also uses a terminal block for convenient installation. The module can also be used in systems with redundant DF1 pathways.

A built-in webserver provides detailed diagnostics of system configuration and operation, including the display of received DF1 communication packets, without the need for any additional software.

1.3 Architecture

The figure below provides an example of the typical network.

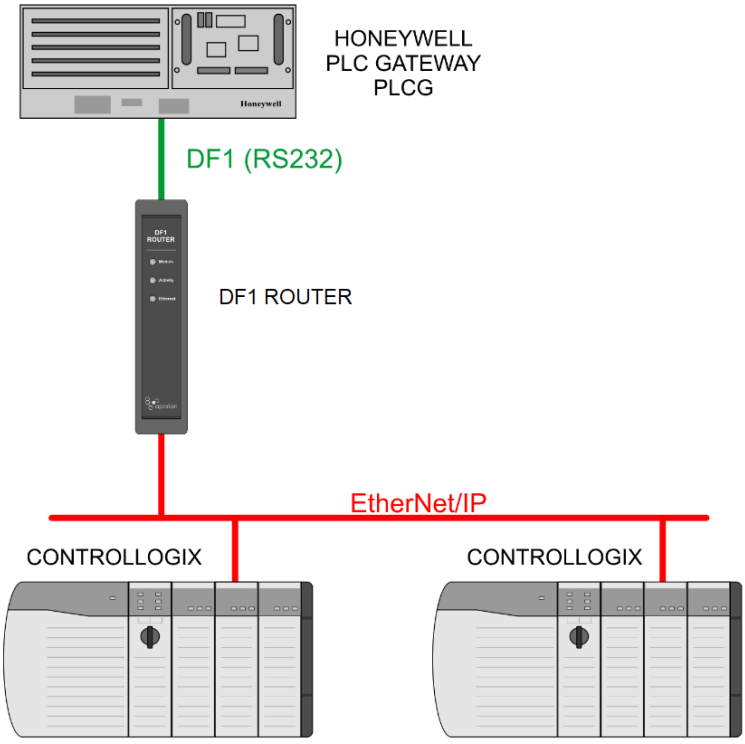


Figure 1.2 - Example of a typical network setup

By converting and redirecting serial DF1 messages from legacy devices to EtherNet/IP, the module provides an interface for data exchange to ControlLogix and CompactLogix platforms.

When connected to devices that provide more than one DF1 port, it is possible to implement DF1 communication redundancy with the use of two PLX51-DF1-ENI's. These can be configured in one of two modes, either *Simultaneous* or *Active / Standby*.

In the *Simultaneous* mode, both modules route the same traffic to the same Logix controller. Effectively, the Logix controller will receive two of each message and process both of them.

Active / Standby mode requires both modes to be Logix "Owned". One of the modules has its routing capability disabled, achieved by setting the Inhibit Routing bit in the output assembly. Logic in the Logix controller can monitor the connection and performance of the Active module and, if necessary, inhibit the Active module and un-inhibit the Standby module.

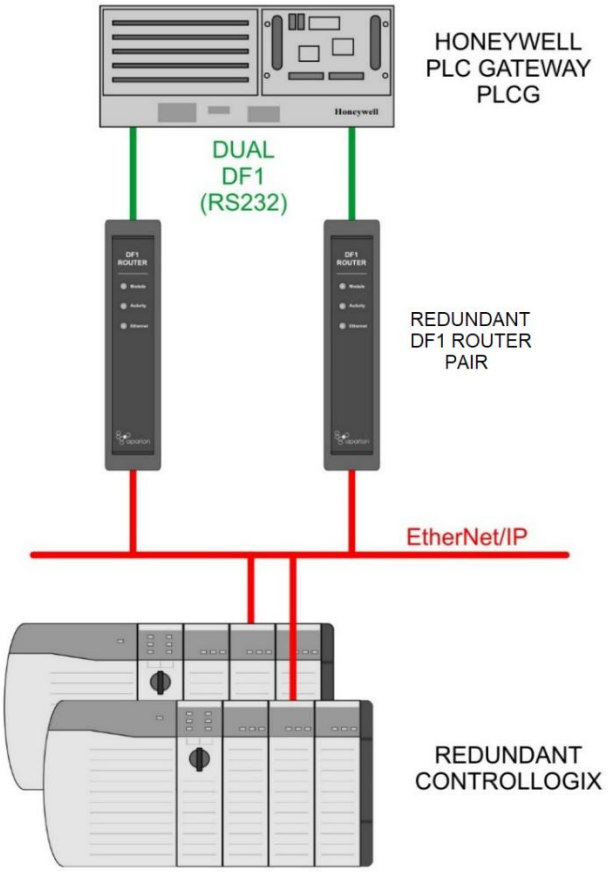


Figure 1.3 - Redundant Architecture

The PLX51-DF1-ENI can be used in redundant Logix controller systems.

Systems that rely on a central ControlLogix communicating to a number of remote DF1 devices, e.g. MicroLogix and SLC stations, may find the PLX51-DF1-ENI useful when upgrading to newer ControlLogix processors, which no longer have a serial port. These systems can easily be upgraded using the PLX51-DF1-ENI without affecting the existing and often costly wireless infrastructure.

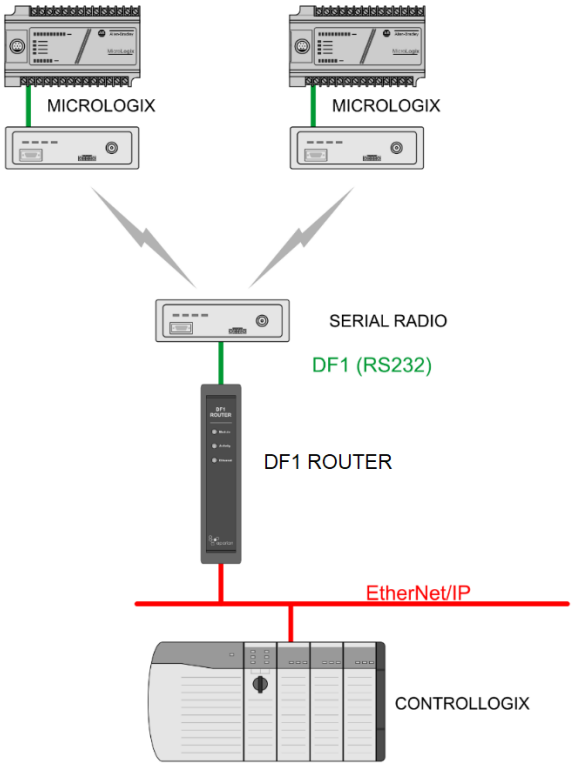


Figure 1.4 – Remote MicroLogix System

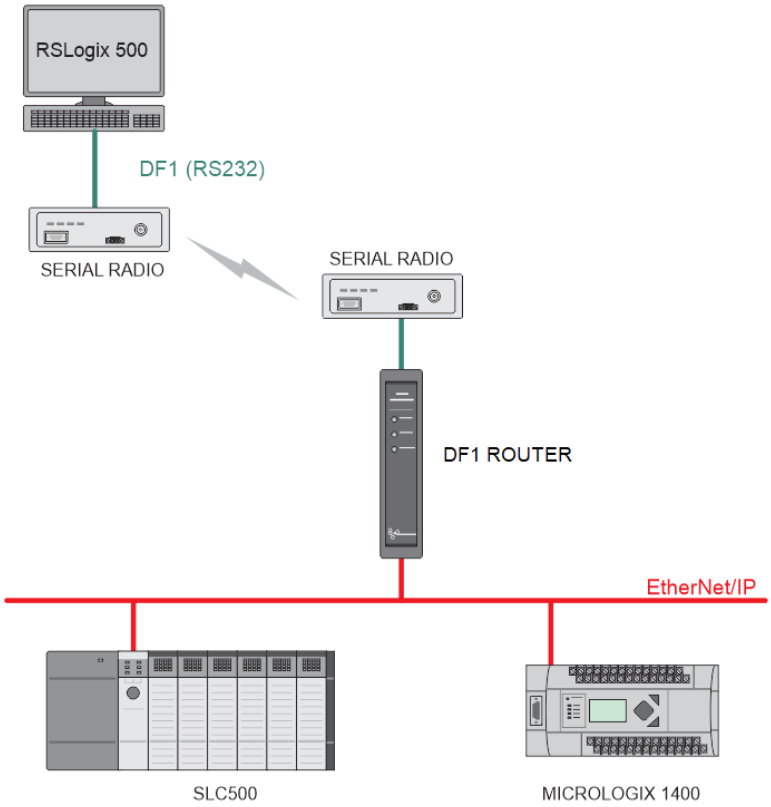


Figure 1.5 – Remote Programming (Half-duplex)

1.4 Additional Information

The following documents contain additional information that can assist you with the module installation and operation.

Resource	Link
PLX50 Configuration Utility Software	www.prosoft-technology.com
PLX51-DF1-ENI User Manual PLX51-DF1-ENI Datasheet Example Code & UDTs	www.prosoft-technology.com
Ethernet wiring standard	www.cisco.com/c/en/us/td/docs/video/cds/cde/cde205_220_420/installation/guide/cde205_220_420_hig/Connectors.html
CIP Routing	The CIP Networks Library, Volume 1, Appendix C: Data Management
Map PLC/SLC messages	SLC to CompactLogix Migration Guide: Chapter 3 – Map PLC/SLC Messages (1769-ap001_-en-p.pdf) EtherNet/IP Network Configuration: Chapter 5 – Mapping Tags (enet-um001_-en-p.pdf)

Table 1.2 - Additional Information

For professional users in the European Union

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.



1.5 Support

Technical support is provided via the Web (in the form of user manuals, FAQ, datasheets etc.) to assist with installation, operation, and diagnostics.

For additional support you can use either of the following:

Resource	Link
Contact Us link	www.prosoft-technology.com
Support email	ps.support@belden.com

Table 1.3 – Support Details

2 Installation

2.1 Module Layout

The module has three ports at the bottom of the enclosure. The ports are used for Ethernet, RS232 serial, and power.

The power port uses a three-way connector which is used for the DC power supply; positive and negative (or ground) voltage, as well as the earth connection.

The RS232 port uses a four-way connector. This provides connection for the communication transmit (TX), receive (RX), and ground (GND) conductors. The fourth connection is used for shielding the cable in high-noise environments.

The Ethernet cable must be wired according to industry standards, which can be found in the additional information section of this document.



Figure 2.1 - PLX51-DF1-ENI side and bottom view

The module provides three diagnostic LEDs. These LEDs are used to provide information regarding the module system operation, the Ethernet interface, and the auxiliary communication interface (RS232).



Figure 2.2 – PLX51-DF1-ENI front and top view

The module provides four DIP switches at the top of the enclosure as shown in the top view figure above.

DIP Switch	Description
DIP Switch 1	Used to force the module into “Safe Mode”. When in “Safe Mode”, the module will not load the application firmware and will wait for new firmware to be downloaded. This should only be used on the rare occasion when a firmware update was interrupted at a critical stage.
DIP Switch 2	This will force the module into DHCP mode which is useful when you have forgotten the IP address of the module.
DIP Switch 3	Used to lock the configuration from being overwritten by the PLX50 Configuration Utility. When set to ‘On’, the PLX50 Configuration Utility will not be able to download to the module.
DIP Switch 4	Upon bootup, the Ethernet IP address will be set to **192.168.1.100** and network mask **255.255.255.0**. The DIP switch can then be set to ‘Off’ to allow the assignment of a static IP address, if needed.

Table 2.1 - DIP Switch Settings

2.2 Module Mounting

The module provides a DIN rail clip to mount onto a 35mm DIN rail.

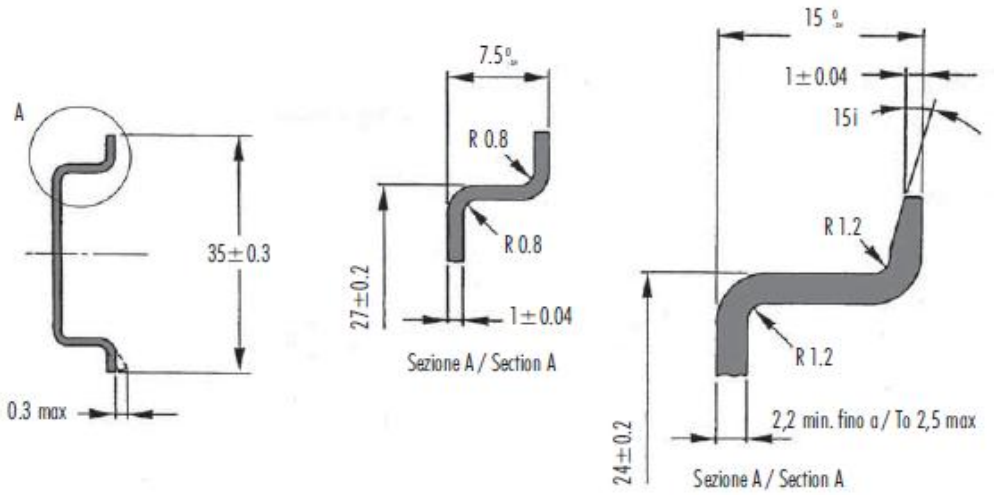


Figure 2.3 - DIN rail specification

The DIN rail clip is mounted on the bottom of the module, toward the back. Use a flat screw driver to pull the clip downward. This will enable you to mount the module onto the DIN rail. Once the module is mounted onto the DIN rail, the clip must be pushed upward to lock the module onto the DIN rail.



Figure 2.4 - DIN rail mouting

2.3 Power

A three-way power connector is used to connect Power+, Power– (GND), and earth. The module requires an input voltage of 10 to 28 VDC. Refer to the technical specifications section in this document.

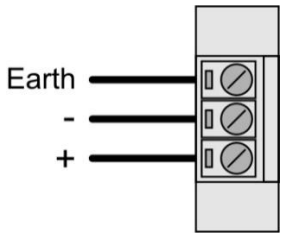


Figure 2.5 - Power connector

2.4 RS232/RS485 Port

The four-way RS232 connector is used to connect the transmit (TX), receive (RX), and GND conductors for serial communication. The shield terminal can be used for shielded cable in high noise environments.

NOTE: The shield of the RS232 port is internally connected to the power connector earth. Thus, when using a shield, it is important to connect the Earth terminal on the power connector to a clean earth. Failing to do this can lower the signal quality of the RS232 communication.

NOTE: When using a shielded cable, it is important that only one end of the shield is connected to earth to avoid current loops. It is recommended to connect the shield to the PLX51-DF1-ENI module, not to the other DF1 device.

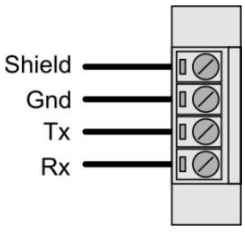


Figure 2.6 - RS232 connector

3 Setup

3.1 Install Configuration Software

The network setup and configuration of the PLX51-DF1-ENI is done in the ProSoft PLX50 Configuration Utility. This software can be downloaded from www.prosoft-technology.com.



Figure 3.1 - ProSoft PLX50 Configuration Utility Environment

3.2 Network Parameters

The module has DHCP (Dynamic Host Configuration Protocol) enabled as factory default. Thus, a DHCP server must be used to provide the module with the required network parameters (IP address, subnet mask, etc.). There are a number of DHCP utilities available, however it is recommended that the DHCP server in the PLX50 Configuration Utility be used.

Within the PLX50 Configuration Utility environment, the DHCP server can be found under the Tools menu.

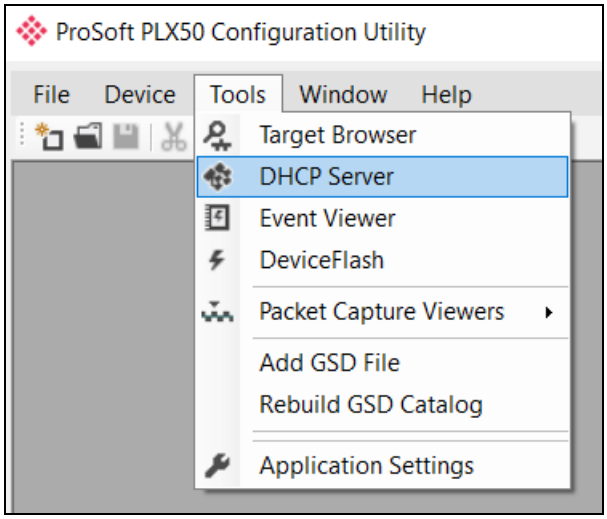


Figure 3.2 - Selecting DHCP Server

Once opened, the DHCP server will listen on all available network adapters for DHCP requests and display their corresponding MAC addresses.

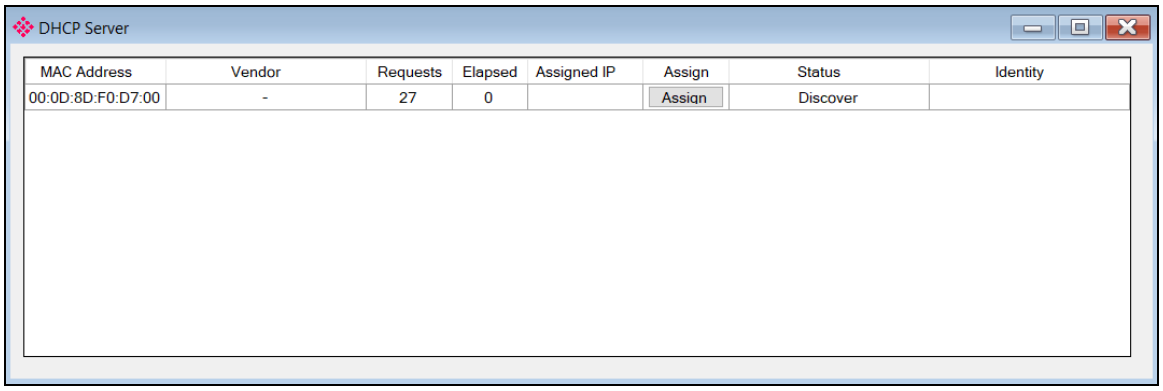


Figure 3.3 - DHCP Server

NOTE: If the DHCP requests are not displayed in the DHCP Server, it may be due to the local PC's firewall. During installation, the necessary firewall rules are automatically created for the Windows firewall. Another possibility could be another DHCP Server is operational on the network and it has assigned the IP address.

To assign an IP address, click on the corresponding “Assign” button. The IP Address Assignment window opens.

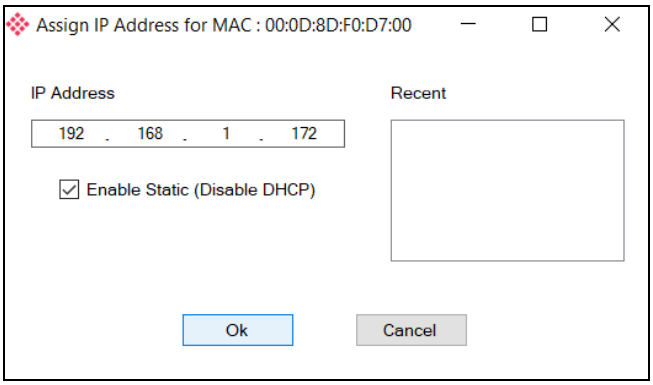


Figure 3.4 - Assigning IP Address

The required IP address can then be either entered, or a recently used IP address can be selected by clicking on an item in the Recent List.

If the “Enable Static” checkbox is checked, then the IP address will be set to static after the IP assignment, thereby disabling future DHCP requests.

Once the IP address window has been accepted, the DHCP server will automatically assign the IP address to the module and then read the Identity object Product name from the device.

The successful assignment of the IP address by the device is indicated by the green background of the associated row.

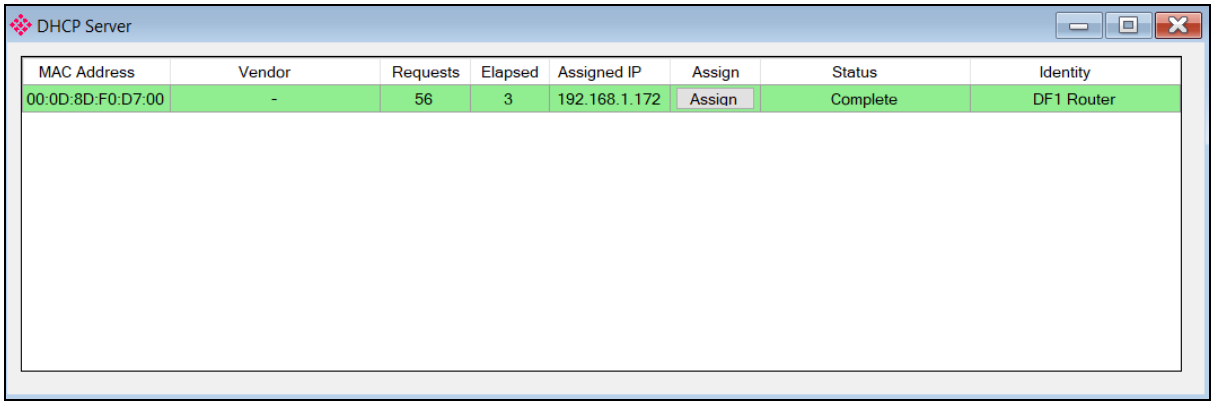


Figure 3.5 - Successful IP address assignment

It is possible to force the module back into DHCP mode by powering up the device with DIP switch 2 set to the **On** position.

A new IP address can then be assigned by repeating the previous steps.

NOTE: It is important to return DIP switch 2 back to the **Off** position, to avoid the module returning to a DHCP mode after the power is cycled again.

In addition to the setting the IP address, a number of other network parameters can be set during the DHCP process. These settings can be viewed and edited in the PLX50 Configuration Utility Application Settings, in the DHCP Server tab.

Once the DHCP process has been completed, the network settings can be set using the Ethernet Port Configuration via the Target Browser.

The Target Browser can be accessed under the Tools menu.

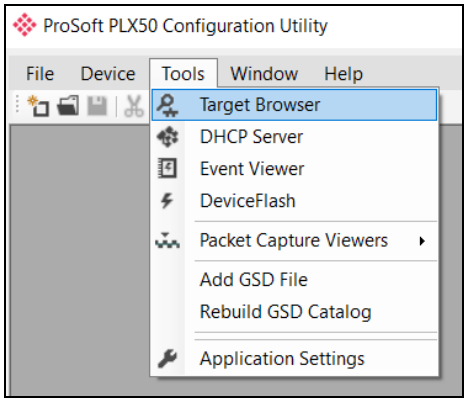


Figure 3.6 - Selecting the Target Browser

The Target Browser automatically scans the Ethernet network for EtherNet/IP devices.

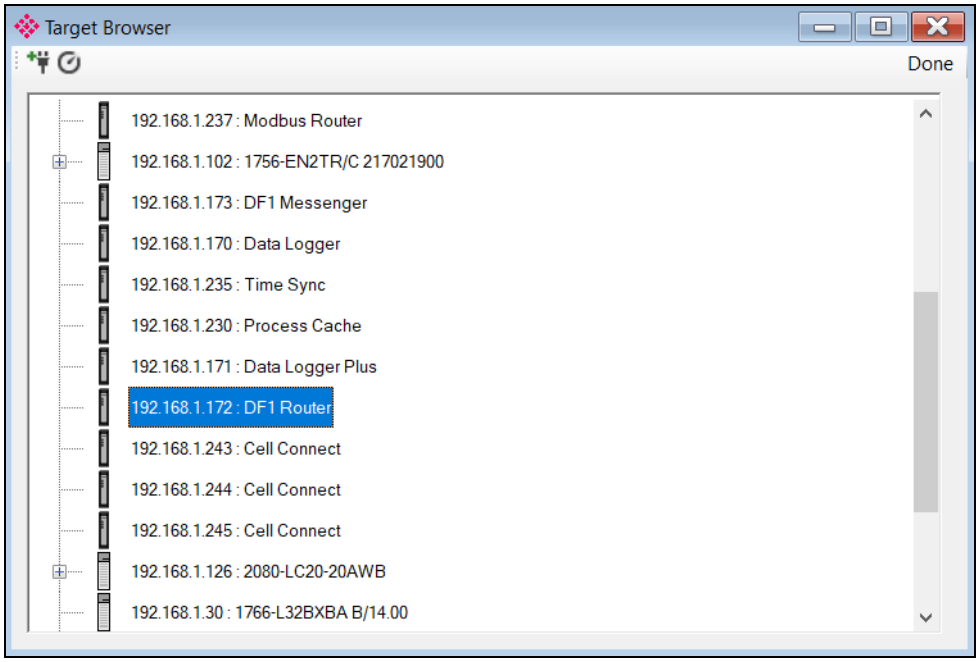


Figure 3.7 - Target Browser

Right-clicking on a device, reveals the context menu, including the Port Configuration option.

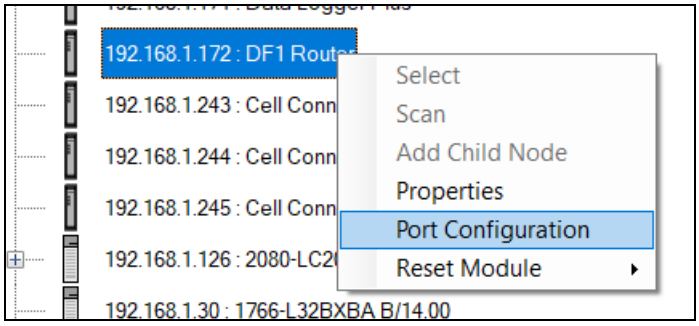


Figure 3.8 - Selecting Port Configuration

The Ethernet port configuration parameters can be modified using the Port Configuration window.

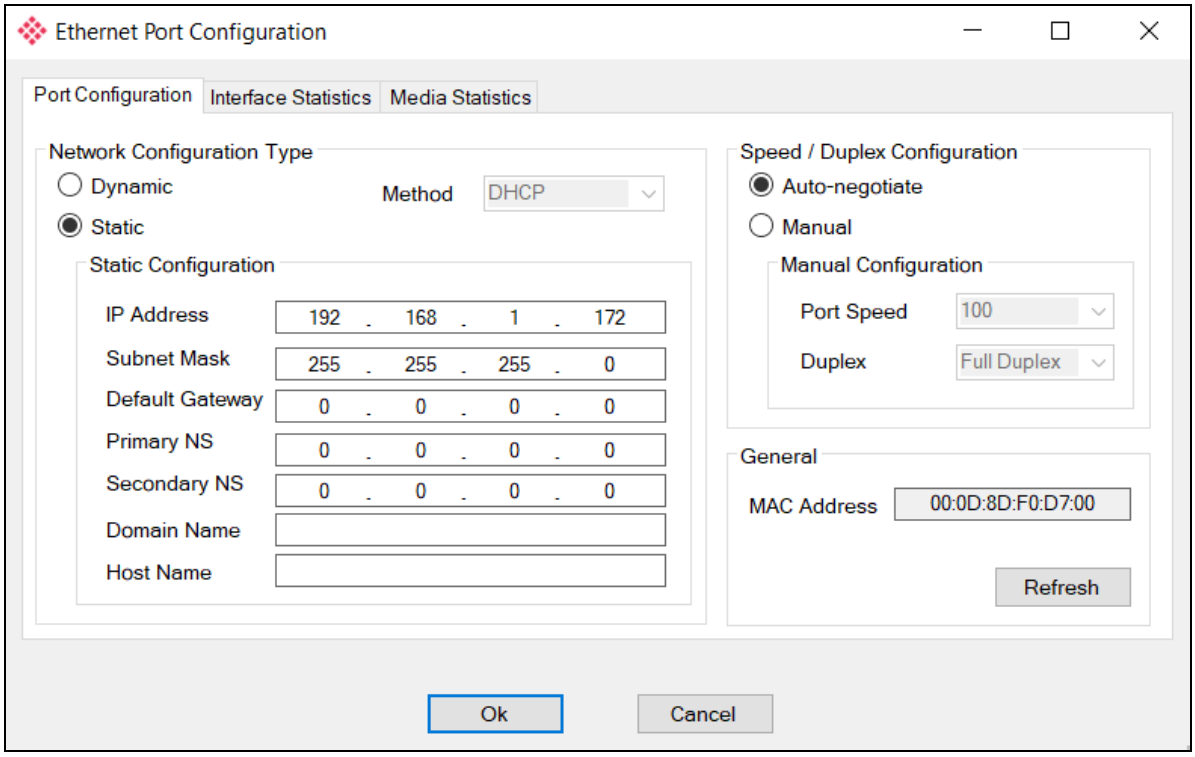


Figure 3.9 - Port Configuration

Alternatively, these parameters can be modified using RSLinx.

3.3 Creating a New Project

Before you configure the module, a new PLX50 Configuration Utility project must be created. Under the File menu, select New.

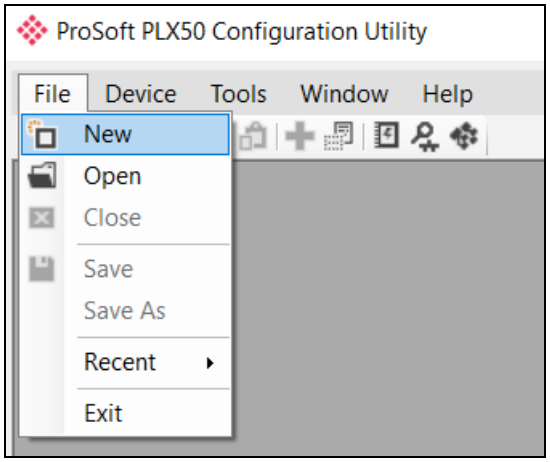


Figure 3.10 - Creating a new project

A PLX50 Configuration Utility project will be created, showing the Project Explorer tree view. To save the project use the Save option under the File menu.

Selecting Add under the Device menu.

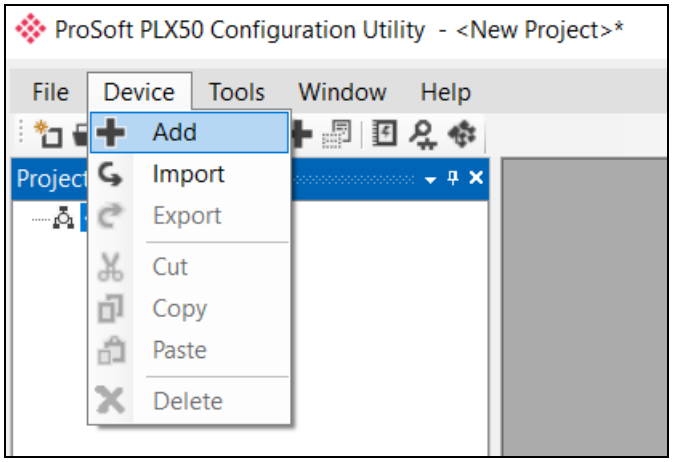


Figure 3.11 - Adding a new device

In the Add New Device window, select the PLX51-DF1-ENI, and click the Ok button.

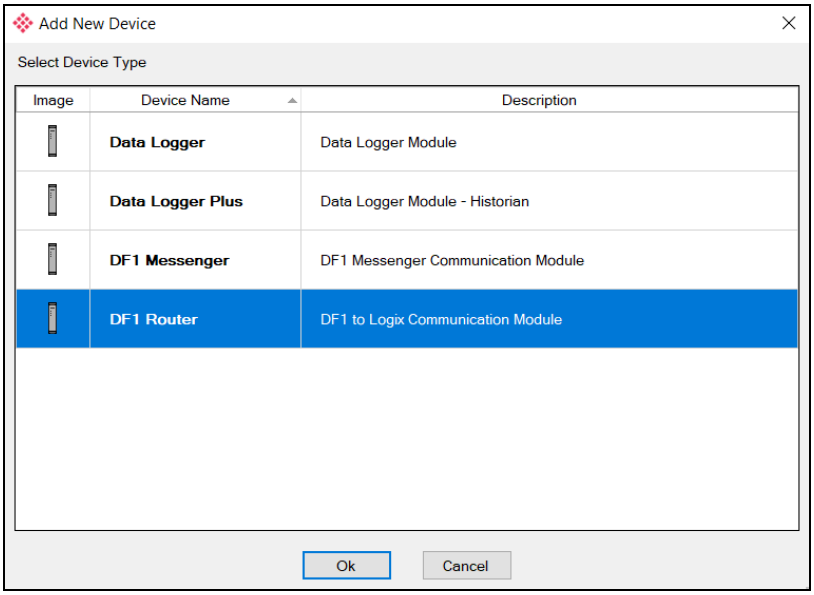


Figure 3.12 – Selecting a new PLX51-DF1-ENI

The device appears in the Project Explorer tree as shown below, and its configuration window opened.

The device configuration window can be reopened by either double clicking the module in the Project Explorer tree or right-clicking the module and selecting *Configuration*.

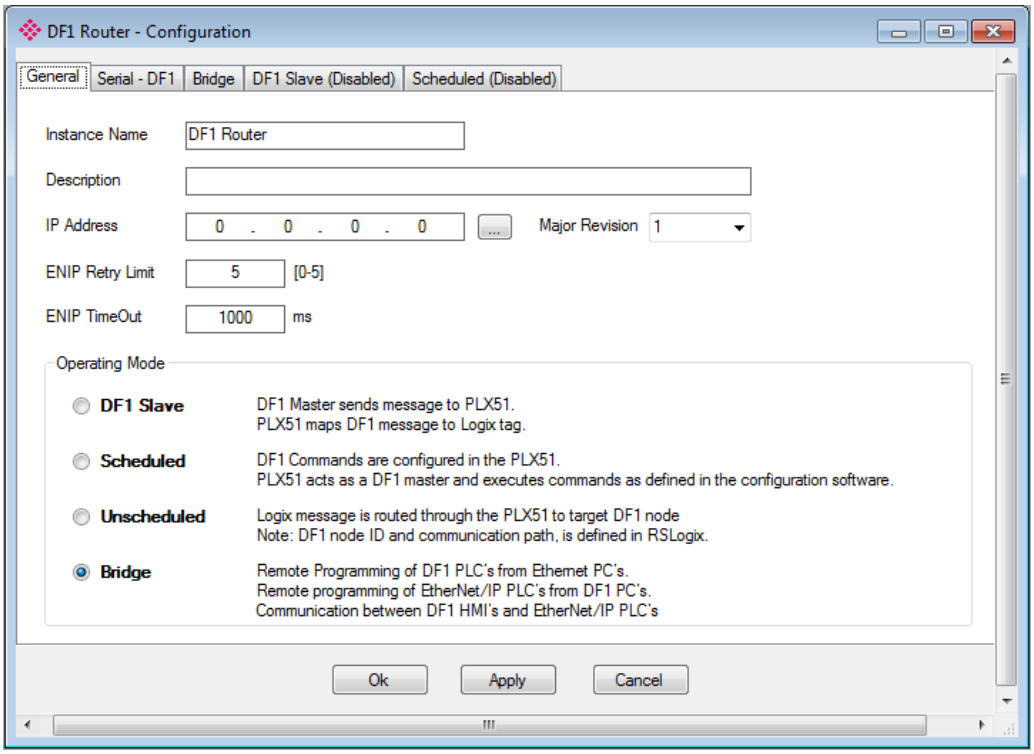


Figure 3.13 – PLX51-DF1-ENI configuration

3.4 DF1 Parameters

The DF1 parameters are configured by the PLX50 Configuration Utility. Refer to the additional information section for documentation and installation links for the ProSoft PLX50 Configuration Utility. The DF1 parameter configuration consists of a general configuration as well as a serial configuration. When downloading the configuration into the module, it will be saved in non-volatile memory that persists when the module is powered down.

The *General* configuration tab consists of the following parameters:

Parameter	Description
Instance Name	This parameter is a user defined name to identify between various PLX51-DF1-ENI's.
Description	This parameter is used to provide a more detailed description of the application for the PLX51-DF1-ENI.
IP Address	IP address of the PLX51-DF1-ENI.
Major Revision	The major revision of the PLX51-DF1-ENI.
ENIP Retry Limit	The amount of EtherNet/IP retries the module will make once no response was received from the Logix Controller.
ENIP TimeOut	The time in milliseconds after which a retry is sent. Once the first retry is sent, the next retry will be sent after the same amount of time. This will be repeated until the ENIP Retry Limit is reached.
Operating Mode	The Operating Mode determines how the DF1 messages are routed: In **DF1 Slave** mode, the module automatically routes the DF1 message and function to the correct Logix tag. In this mode, the PLX51-DF1-ENI maps the DF1 request to the preconfigured tag. Communication in this mode is initiated by the remote DF1 device. In **Scheduled** mode, the PLX51-DF1-ENI will initiate the exchange between the remote DF1 device and Logix. Either by reading data from a DF1 device and writing it into a preconfigured Logix tag or vice versa. Communication in this mode is initiated by the PLX51-DF1-ENI. In **Unscheduled** mode, the PLX51-DF1-ENI routes Logix messages to the remote DF1 device and returns the result. There is little configuration required in the PLX51-DF1-ENI as the routing information is configured by Logix for each message transaction. Communication in this mode is initiated by Logix. In **Bridge** mode, the module uses the PCCC message exchange to read or write various tags in the Logix controller. Therefore, in this mode, the module relies on the Logix controller to map the DF1 request to the preconfigured Logix tag. Communication in this mode is initiated by the remote DF1 device. Refer to the message routing section for an explanation of the routing operation.

Table 3.1 - General configuration parameters

The DF1 General configuration window is opened by either double clicking on the module in the tree or right-clicking the module and selecting *Configuration*.

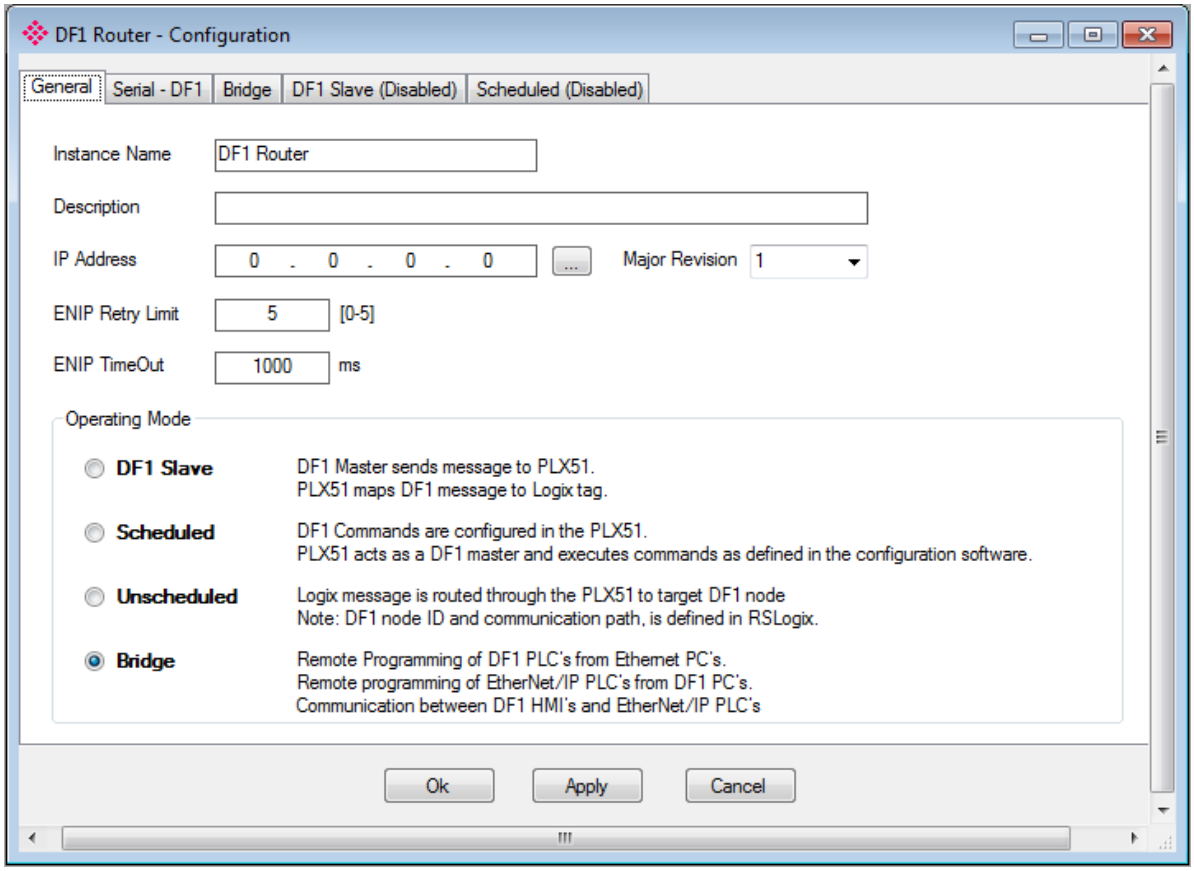


Figure 3.14 - General Configuration

The *Serial - DF1* configuration tab is shown in the figure below. The DF1 Serial configuration window is opened by either double clicking on the module in the tree or right-clicking the module and selecting *Configuration.*

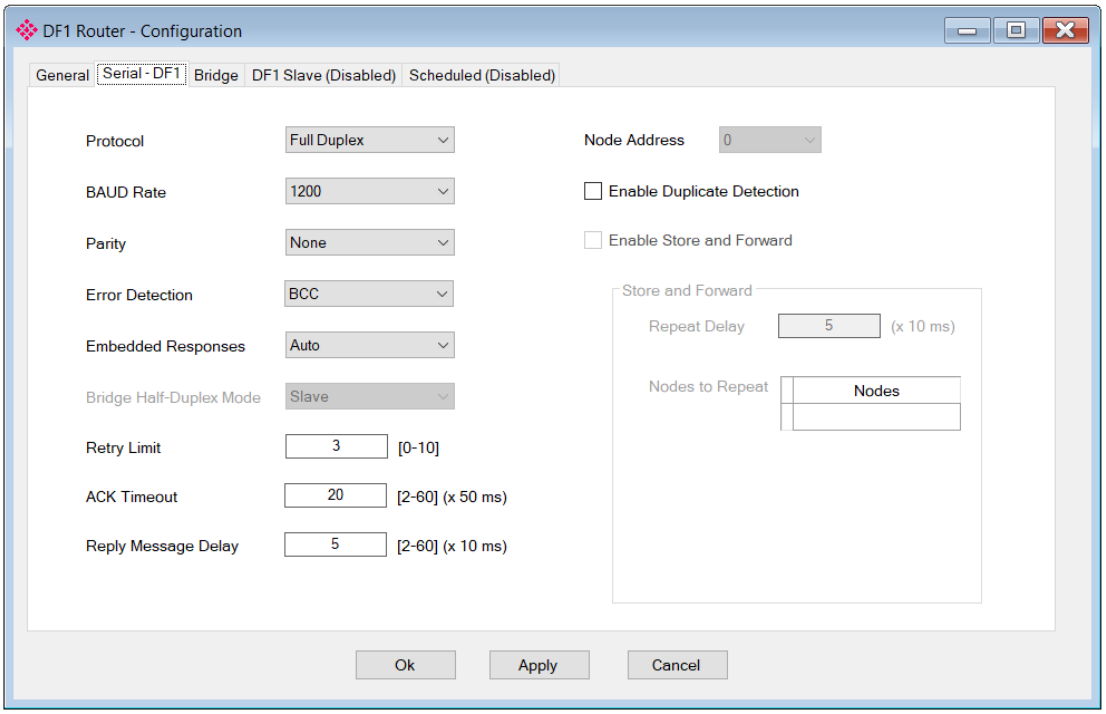


Figure 3.15 - Serial DF1 configuration

The Serial – DF1 configuration tab consists of the following parameters:

Parameter	Description
Protocol	The protocol parameter configures the module to operate in full duplex, half duplex, or Radio Modem mode on the DF1 network.
BAUD Rate	The BAUD rate configures at what speed the data is sent across the RS232 serial network. The module provides the following speeds: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200
Parity	This parameter configures the parity of the module's RS232 serial port. The module allows for Even, Odd, or None parity setting.
Error Detection	The module can be configured to perform either BCC or CRC checksum validation on incoming and outgoing packets. CRC checksum is a much stronger validation method when compared to BCC but is more processor intensive to perform.
Embedded Responses	This parameter configures the module to add the acknowledge responses in the data payload. You can configure the module to be Auto Detect or On. This function is only available in Full Duplex mode.
Bridge Half-Duplex Mode	This parameter configures the port as a DF1 Slave or DF1 Master.
Retry Limit	This determines how many times the module must retry and exchange the message before failing it.
ACK Timeout	This is used to determine the interval between retries when a message exchange has failed.

Reply Message Delay	This is the minimum delay before the DF1 reply is transmitted to the DF1 device.
Node Address	This is only configurable in Unscheduled mode. In all other modes the node address is dynamically changed to suit the required mapping.
Enable Duplicate Detection	This configures the module to check for duplicate packets and flag them when they occur.
Enable Store and Forward	When using the Radio Modem protocol, the PLX51-DF1-ENI can be used to repeat messages from other nodes on the radio network (only relevant for DF1 Radio Modem protocol).
Repeat Delay	When repeating packets from other nodes on the Radio network, this setting determines the delay before repeating the packet (only relevant for DF1 Radio Modem protocol).
Nodes to Repeat	When Store and Forward has been enabled, the Nodes to Repeat list is all the nodes' numbers of the devices from which the PLX51-DF1-ENI must repeat the messages (only relevant for DF1 Radio Modem protocol).

Table 3.2 - Serial DF1 configuration parameters

3.5 Message Routing

The module can be configured to route DF1 data in one of four modes:

- Bridge mode
- DF1 Slave mode
- Schedule Tag mode
- Unscheduled mode

3.5.1 Bridge Mode

The Bridge Mode can be used for redirecting messages between the DF1 and Ethernet port. This mode allows for various remote programming options and well as mapping DF1 (PCCC) messages to a Logix controller when using the Logix PLC mapping feature.

To open the Bridge map configuration window by double clicking on the module in the tree or right-clicking the module and selecting *Configuration.* Once in the configuration window select the third tab at the top *Bridge*. The Bridge map configuration is shown in the figure below.

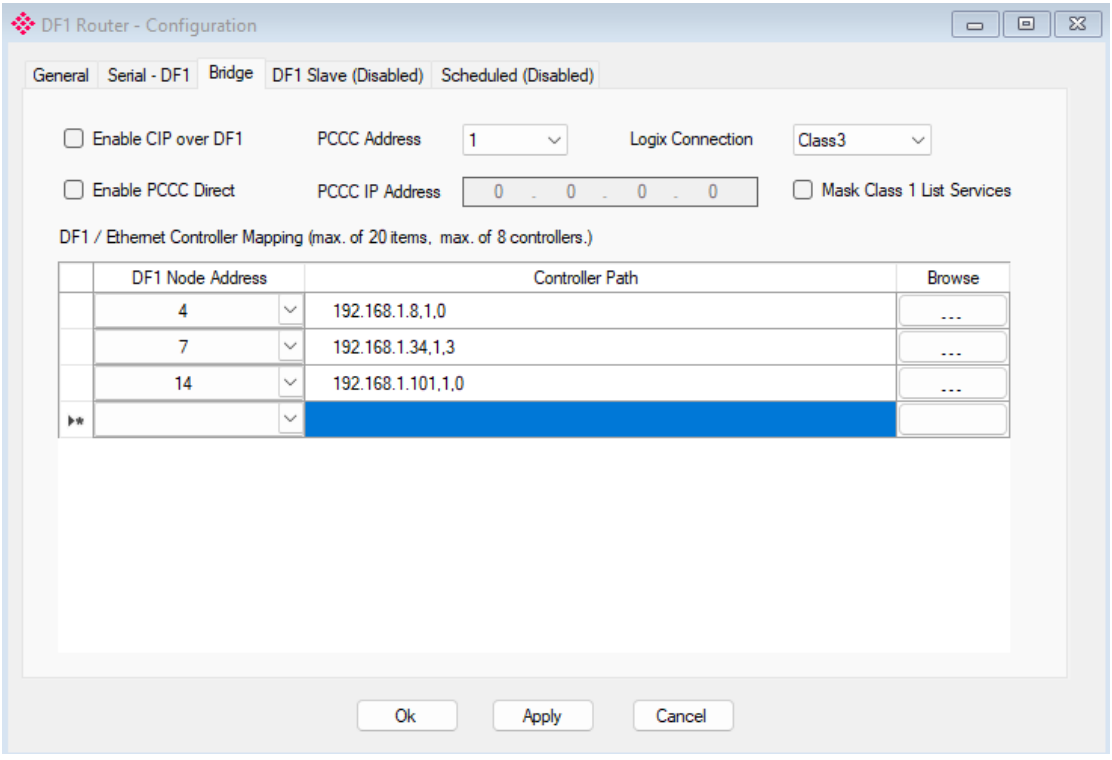


Figure 3.16 - Bridge map configuration

The module can emulate more than one destination DF1 Node Address, and thus route multiple messages to different Ethernet devices. For this reason it is important to enter the correct associate DF1 Node address in each mapping record.

When using PCCC data messaging the connection class can be configured by selecting either Class 3 or Unconnected (UCMM) messaging. This is done by selecting from the Connection drop-down box in the Bridge tab.

The controller paths can either be entered manually or you can browse to them by clicking the Browse button. The Target Browser requires the controller to be available on the network. The Target Browser will open and automatically scan for all EtherNet/IP devices.

If the Ethernet/IP module is a bridge module, it can be expanded by right-clicking on the module and selecting the Scan option.

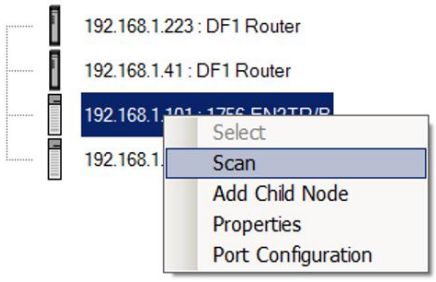


Figure 3.17 - Scanning node in the Target Browser

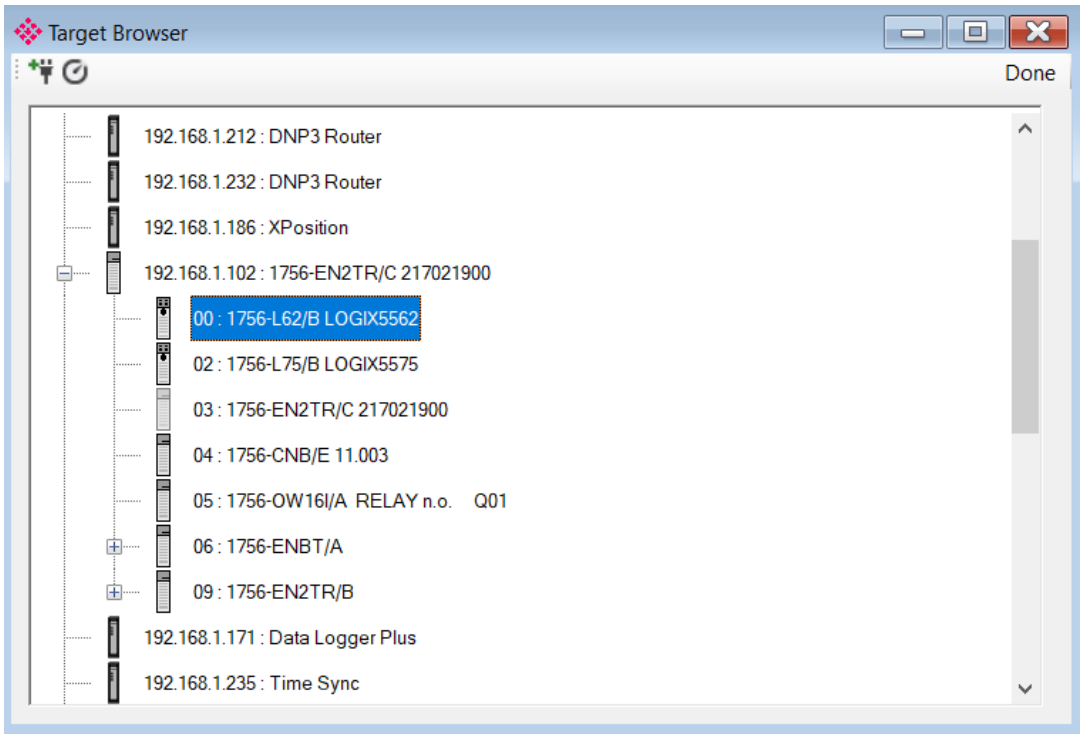


Figure 3.18 - Target Browser selection

The required controller can then be chosen by selecting it and clicking the Ok button, or by double-clicking on the controller module.

A maximum number of 20 mapping entries can be added.

Parameter	Description
DF1 Node Address	This parameter is one of the destination addresses that the PLX51-DF1-ENI will accept. When the DF1 message initiator sends a message to a specific DF1 node address that has been configured in the module, it will be accepted and routed to the paired Controller Path. This is the destination node address of the message, and not the source address of the DF1 device.
Controller Path	The Ethernet/CIP path to the end device (e.g. Logix controller). Refer to the additional information section in this document for references to details routed CIP path information. For example: If the controller (slot 0) is in a chassis with an Ethernet bridge (IP address 192.168.1.20) connected to the local network, follow the format; *Ethernet bridge IP address, chassis backplane port, module slot etc.* 192.168.1.20,1,0 For PLC5 and SLC500/MicroLogix devices, the path should contain only the device's IP address.
Enable CIP over DF1	This feature enables the PLX51-DF1-ENI to support CIP serial, allowing you to program ControlLogix/CompactLogix controllers via the Serial Port. **Note:** You will not be able to communicate over PCCC Direct and CIP at the same time. If CIP over DF1 is enabled, the software automatically disables the PCCC Direct option.
Enable PCCC Direct	The PCCC Direct option allows the PLX51-DF1-ENI to support the PCCC protocol on a separate IP address. The PCCC protocol will allow the DF1 Router to emulate a legacy controller (eg. SLC5/03) as if it is directly connected to the Ethernet network.
PCCC Address	The PCCC Address allows the user to force the destination address of the DF1 message that is routed via the PCCC protocol or the CIP embedded PCCC message. This is useful when using certain RSLinx Enterprise drivers in FTView which does not allow the user to choose the destination DF1 Node address.
PCCC IP Address	The IP address of the supported PCCC Protocol.
Logix Connection	The connection class used by the mapped items to the Logix controller.

Table 3.3 - Bridge Map parameters

Bridge Mode - Remote Programming

The following example makes use of the PLX51-DF1-ENI to program multiple SLC / MicroLogix stations connected on Ethernet, across a serial DF1 radio network.

NOTE: This functionality does not apply to ControlLogix or CompactLogix.

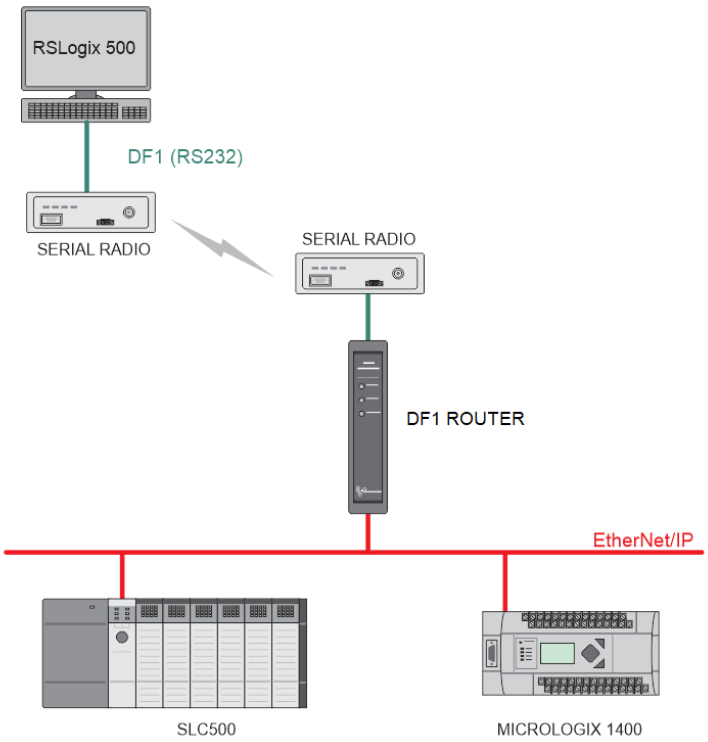


Figure 3.19 – Remote Programming Example 1

The PLX51-DF1-ENI is configured in a Half-Duplex mode, to allow multiple EtherNet/IP devices. The Bridge Mode configuration is configured to map the virtual node address 1 to the SLC500 (192.168.1.241) and virtual node address 2 to (192.168.1.30).

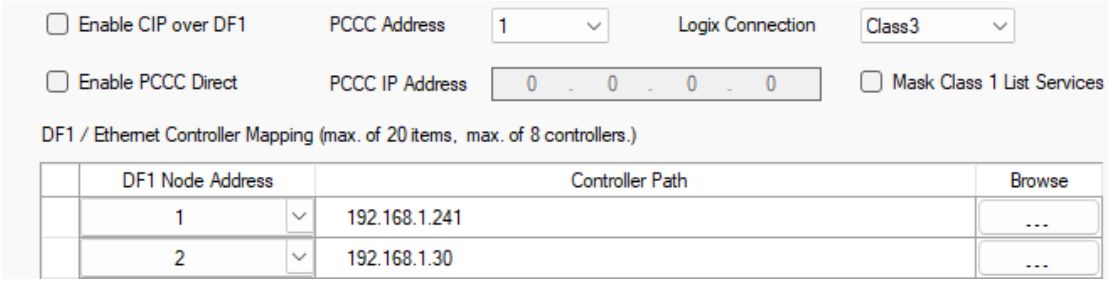


Figure 3.20 – Remote Programming Example 1 – Bridge Configuration

RSLinx is configured using the DF1 Polling Master Driver. The DF1 settings should match those configured in the PLX51-DF1-ENI, e.g. Half-Duplex, BAUD rate, parity, error checking etc.

The configured nodes (1 & 2) must also be added to the Polling list definition.

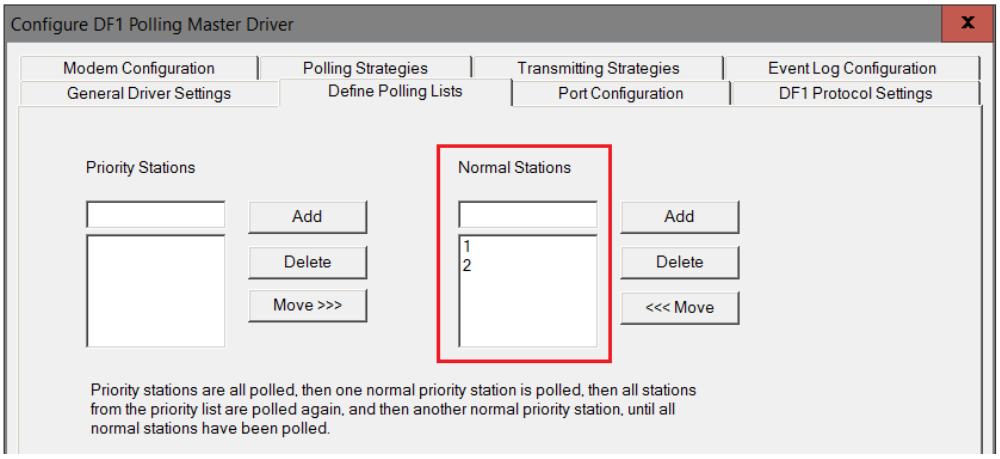


Figure 3.21 – Remote Programming Example 1 – RSLinx Configuration

Once configured the two remote stations will appear in the RSLinx RSWho browser and can be accessed by RSLogix 500.

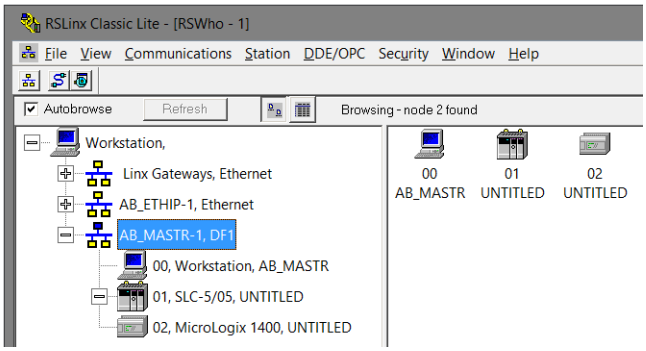


Figure 3.22 – RSLinx RSWho browser

The second remote example allows a remote serial DF1 device (SLC500) to be programmed via a PLX51-DF1-ENI across an Ethernet network.

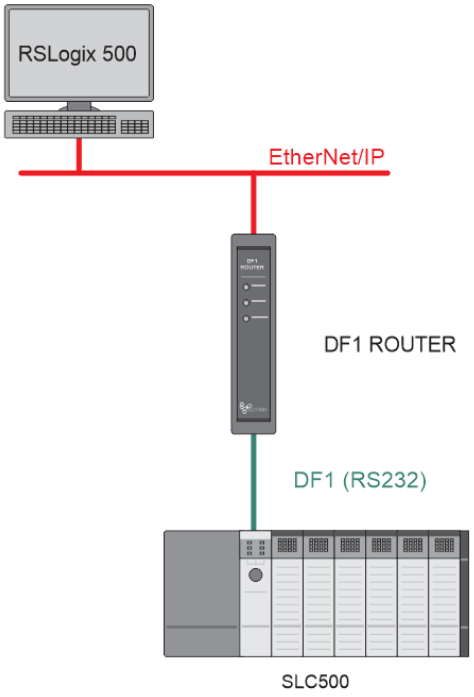


Figure 3.23 – Remote Programming Example 2

As with the previous example it is important that the DF1 settings of the remote device match that of the PLX51-DF1-ENI. The PLX51-DF1-ENI should be configured for Full-Duplex, and although using the Bridge mode, no mapping entries are required.

After adding the EtherNet/IP driver in RSLinx, the PLX51-DF1-ENI will automatically appear. For the routing to work, the EDS file must be installed, which can be uploaded from the device. The remote serial device will appear under the PLX51-DF1-ENI's DF1 Port in the RSLinx RSWho browser.

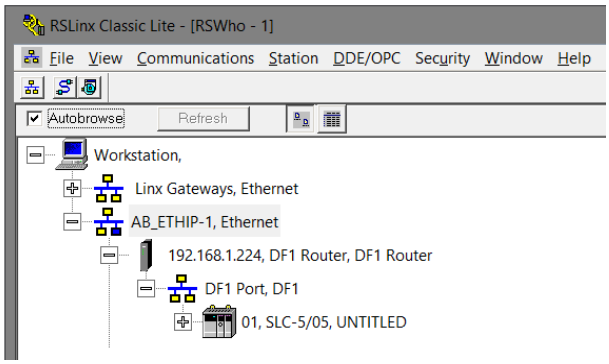


Figure 3.24 – Remote Programming Example 2 – RSLinx RSWho browser

Bridge Mode – Data Mapping

In Bridge mode the PLX51-DF1-ENI will redirect a DF1 PCCC message to a Logix controller at a preconfigured path. Therefore, in this mode, the module will rely on the Logix controller to map the DF1 request to the preconfigured Logix tag.

The Bridge map configuration is a two-step process. First, the PLX51-DF1-ENI must be configured to route specific DF1 addresses to a controller path. The second step is to map the DF1 addresses to Logix tags using RSLogix 5000.

The DF1 message initiator (e.g. DCS gateway) will send a read or write request to a specific DF1 address on RS232. You must configure the PLX51-DF1-ENI to route the message destined for a specific DF1 address to a Logix controller. This will allow the correct Logix controller to map the request to the Logix PLC/SLC mapped tag. For each route map, you must enter two parameters as described in the table below.

Below are two examples of how DF1 messages are routed to the Logix controller.

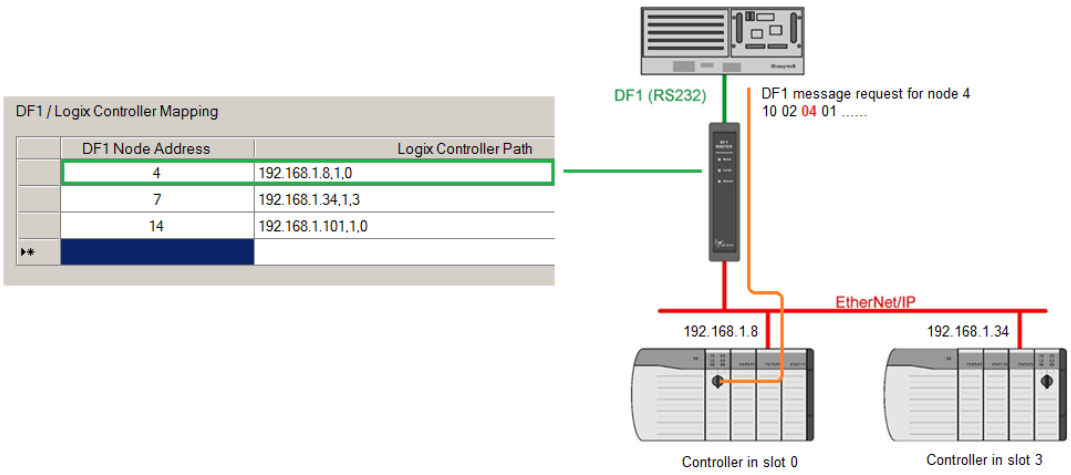


Figure 3.25 – Example 1 - Bridge routing map – node 4

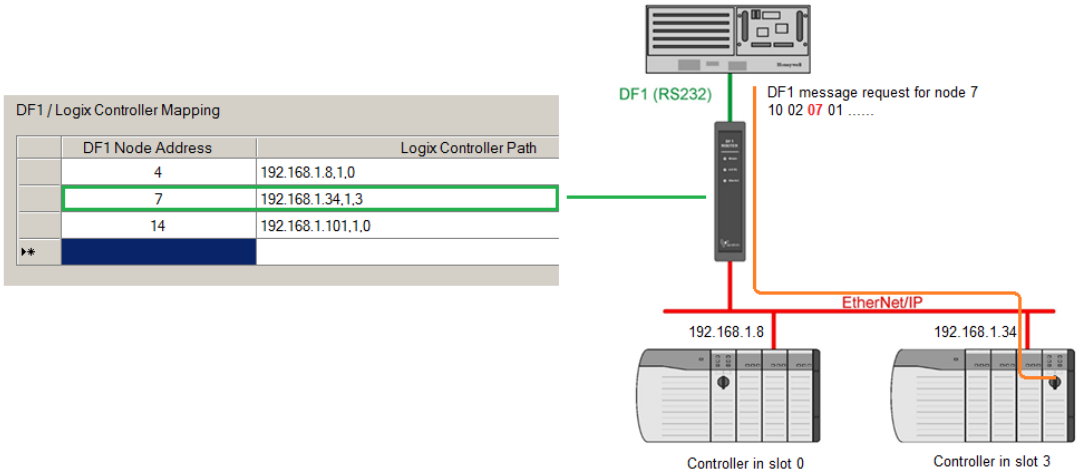


Figure 3.26 – Example 2 – Bridge routing map – node 7

The second part of the Bridge routing map setup is to map the DF1 request received by the Logix controller to a Logix tag. This must be done in Rockwell Automation's RSLogix 5000. Refer to the additional information section in this document for further information regarding mapping of PLC/SLC messages in the Logix controller. Open the mapping table in RSLogix 5000 by selecting *Map PLC/SLC Messages* from the *Logic* menu item in the menu bar. You must enter the requested file number and Logix tag name pair to ensure that the read or write request is routed to the correct Logix tag. Below is an example of the RSLogix 5000 PLC5/SLC mapping.

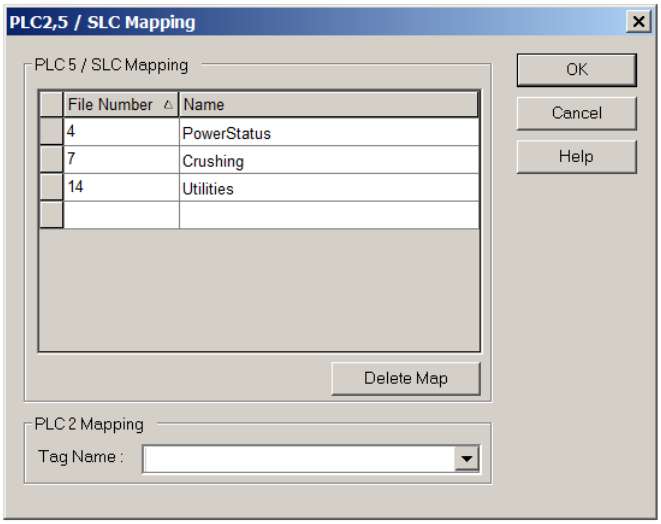


Figure 3.27 - Example of Mapping PLC/SLC Messages in RSLogix 5000

NOTE: PCCC communication is not supported when using Redundant Logix L8/L9 Controllers. The built-in Logix PLX/SLC Mapping will not be available. In this instance, the Reactive Mode of the PLX51-DF1-ENI must be used.

NOTE: It is your responsibility to ensure that the Logix tag array datatype and size matches that of the DF1 File Number. Failing to do this can result in communication faults.

3.5.2 DF1 Slave Mode

The DF1 Slave routing mode allows mapping of virtual Data Files to Logix tags across multiple controllers. This is similar to the Bridge mode except the mapping of data files to Logix tags, is no longer managed in Logix, but in the PLX51-DF1-ENI itself.

Thus, the routing of the Node address to Logix controller as well as DF1 File Number to a Logix tag is managed by the PLX51-DF1-ENI where in Bridge mode, the DF1 File Number was routed to a tag by the Logix controller. In the DF1 Slave mode, the PLX51-DF1-ENI can operate completely independently from the Logix controller by directly reading and writing to Logix tags.

NOTE: The DF1 Slave mode only works with PLC5, SLC Typed Read and Write messages as well as PLC2 Unprotected Read and Write messages.

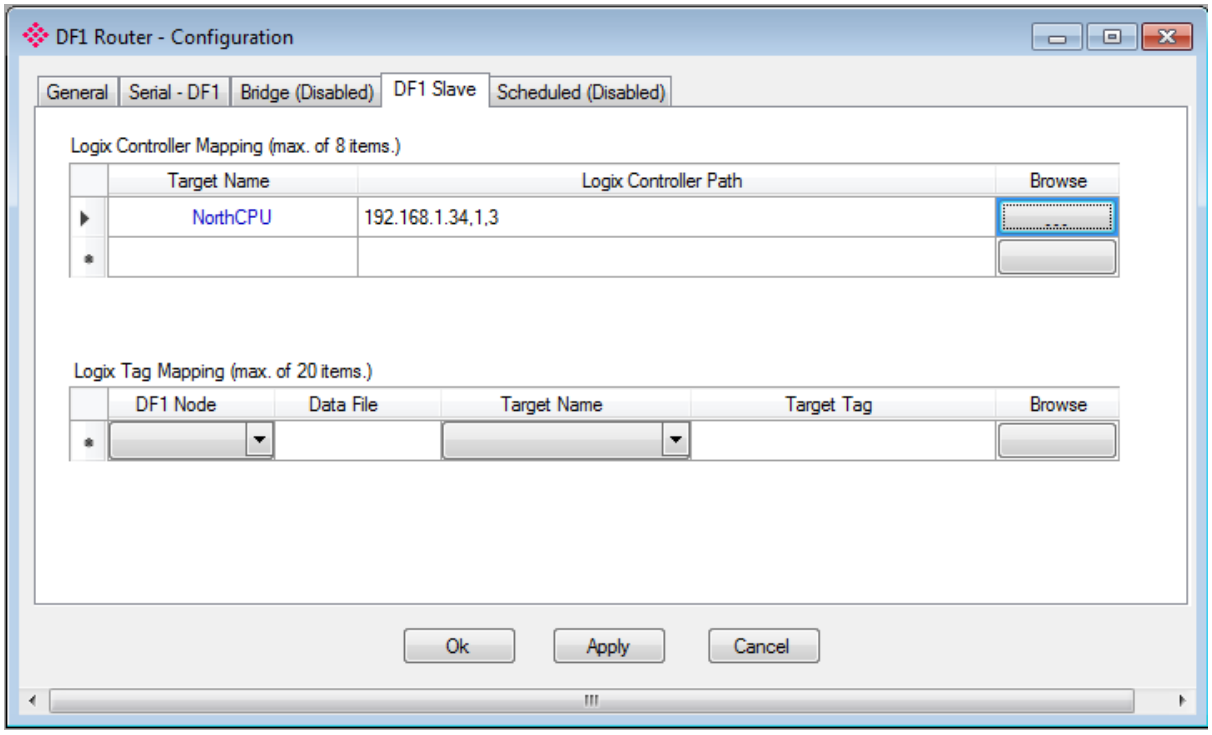


Figure 3.28 - DF1 Slave mode configuration

The DF1 Slave mode is configured in two steps. First, you must create a Target Name (CIP path to the destination Logix controller) which will be used to link the DF1 File Number to the destination Logix tag. When using PLC2 messages, the Target will be linked to the DF1 Node Number. Therefore, if the device sending out PLC2 requests wants to access multiple Target Tags, it will need to differentiate by using different Node Numbers.

The Logix controller paths can either be entered manually or you can browse to them by clicking the Browse button. The Target Browser will open and automatically scan for all available EtherNet/IP devices.

If the EtherNet/IP module is a bridge module, it can be expanded by right-clicking on the module and selecting the Scan option.

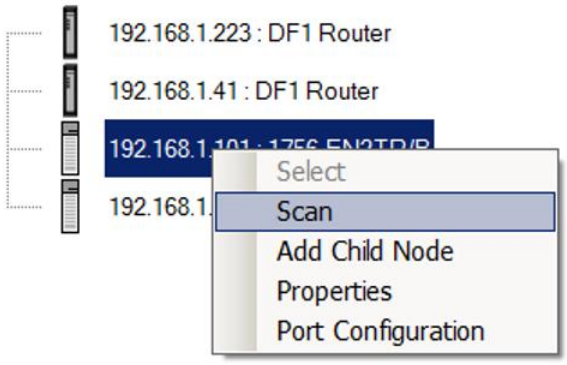


Figure 3.29 - Scanning node in the Target Browser

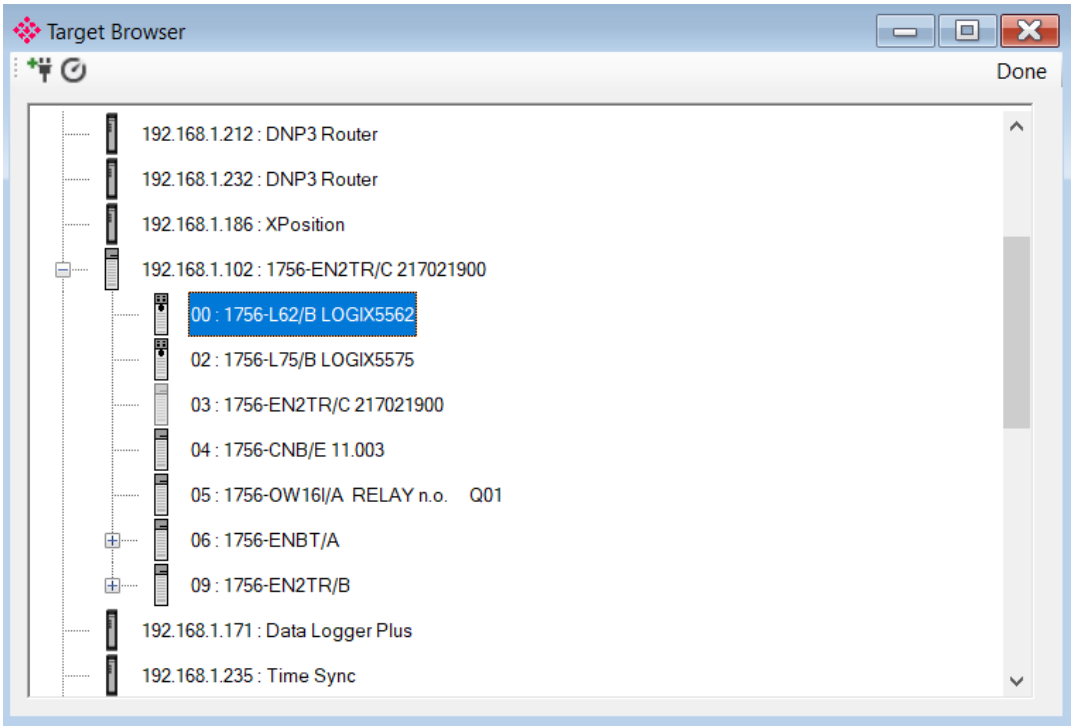


Figure 3.30 - Target Browser selection

The required Logix controller can then be chosen by selecting it and clicking the Ok button, or by double-clicking on the controller module.

A maximum number of 8 controller mapping entries can be added.

The second part of the DF1 Slave mode is to configure the link between a DF1 node and File Number combination to a Logix tag. This will allow the DF1 message initiator to effectively write to, or read from, a Logix tag using traditional File Numbers (e.g. N7, F8, etc.).

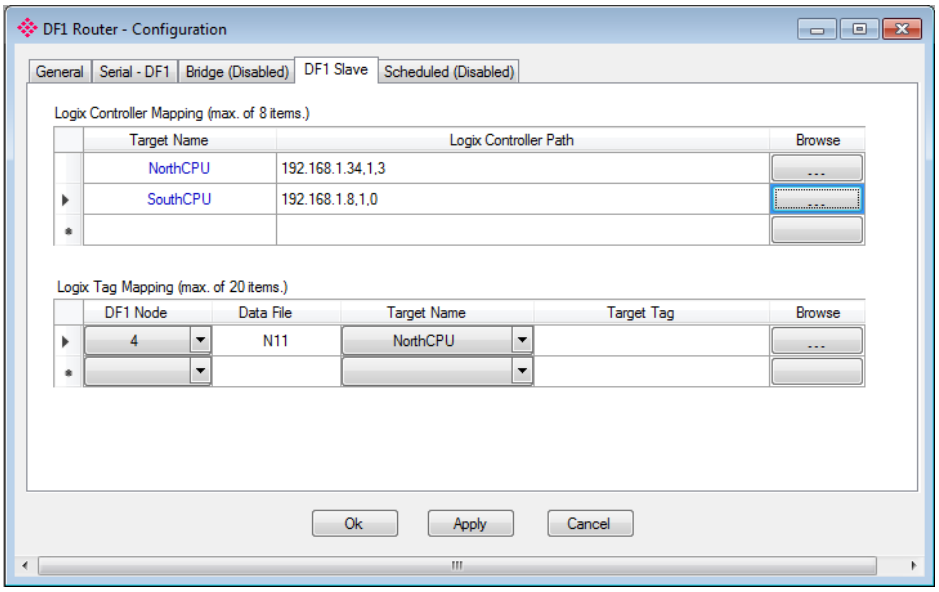


Figure 3.31 – DF1 Slave Mapping

NOTE: When using PLC-2 messages, there are no data files. You are required to enter **PLC2** in the space of the data file as shown below. Only the DF1 Node address will be used to link the selected Target Tag to the incoming PLC2 DF1 message.

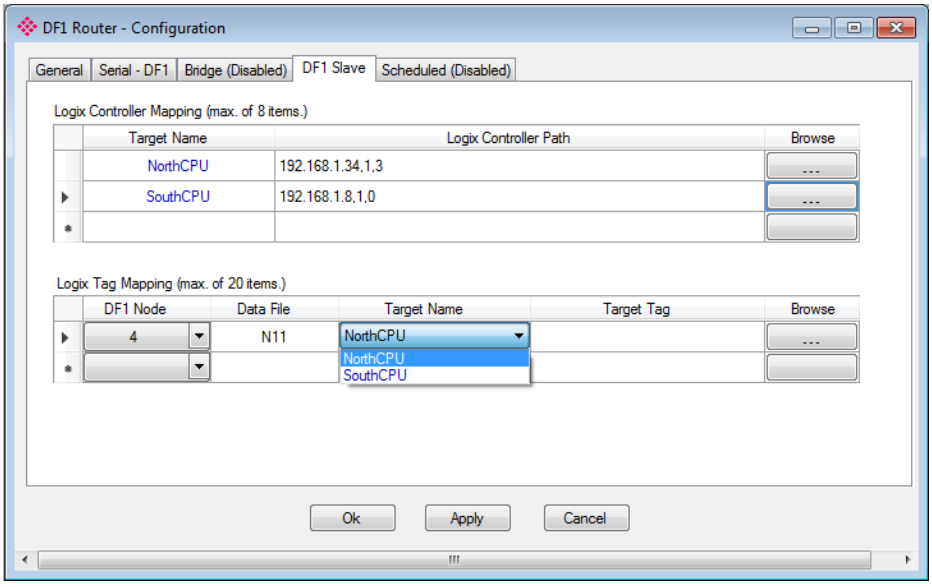


Figure 3.32 – DF1 Slave Mapping (PLC2 Messages)

NOTE: When using Unprotected Bit Write PLC-2 messages, only one byte's worth of bits can be written at a time.

The module can emulate more than one destination DF1 Node Address, and thus route multiple messages to different Logix controllers. For this reason it is important to enter the correct associate DF1 Node address in each mapping record.

The next column is used to enter the DF1 data file. It is important to enter only the file here (e.g. N11) and not a data word address (e.g. N11:0). The first element of the entered DF1 file (e.g. N11:0) will then map to the first element of the Logix array and so on. When using PLC2 messages, type in “PLC2” into the Data File field as shown in figure 3.27.

Below is an example of the target tag selection. The Target Tag can be either entered manually or selected using the Tag Browser in the PLX50 Configuration Utility. The Tag Browser requires the controller to be available on the network.

To browse to the tag, click on the Browse button. The Tag Browser opens and scans all the tags inside that controller. If the controller has been recently scanned in this session, then a cached version of the tags is displayed. A rescan of the tags can be triggered by selecting the Refresh button in the Tag Browser’s toolbar.

All non-array tags will be disabled, guiding you to select a suitable tag.

NOTE: When mapping PLC5 Boolean files (e.g. B3), it is recommended that the destination Logix tag be a SINT array, rather than a Boolean array. Using the latter may result in unexpected results due to the packing format of Logix Boolean arrays.

NOTE: When mapping PLC2 messaging, only INT datatypes will be supported. Thus, the Target Tag must be an array of INTs.

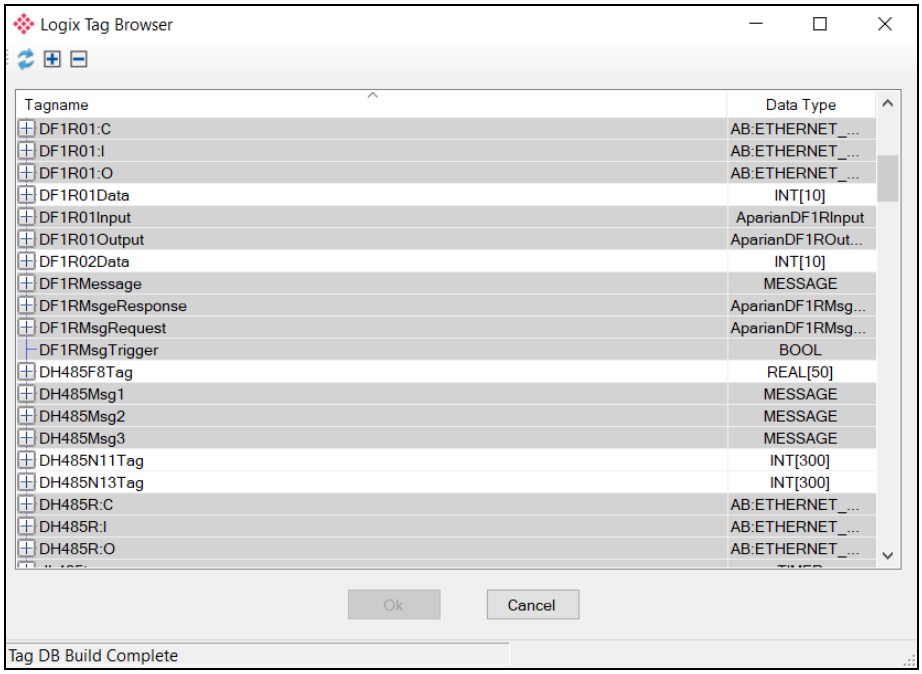


Figure 3.33 – Tag Browser tag selection

The two figures below show how DF1 messages are routed to the Logix tags using the DF1 Slave Map mode.

NOTE: It is your responsibility to ensure that the Logix tag array datatype and size matches that of the DF1 File Number. Failing to do this can result in communication faults.

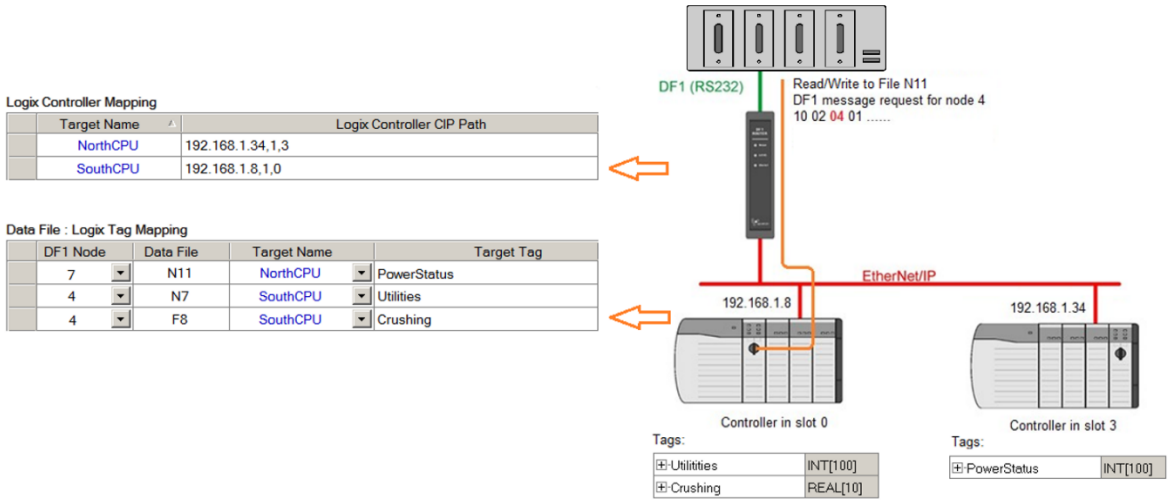


Figure 3.34 - DF1 Slave mode configuration in the PLX50 Configuration Utility

When receiving PLC2 messages, the Data File entered into the PLX50 Configuration Utility will be “PLC2” because there are no Data Files in PLC2 message structures. Thus, the DF1 Node address will be used to route the messages as shown below:

NOTE: It is your responsibility to ensure that the Logix tag array datatype and size matches the PLC2 DF1 request. Failing to do this can result in communication faults.

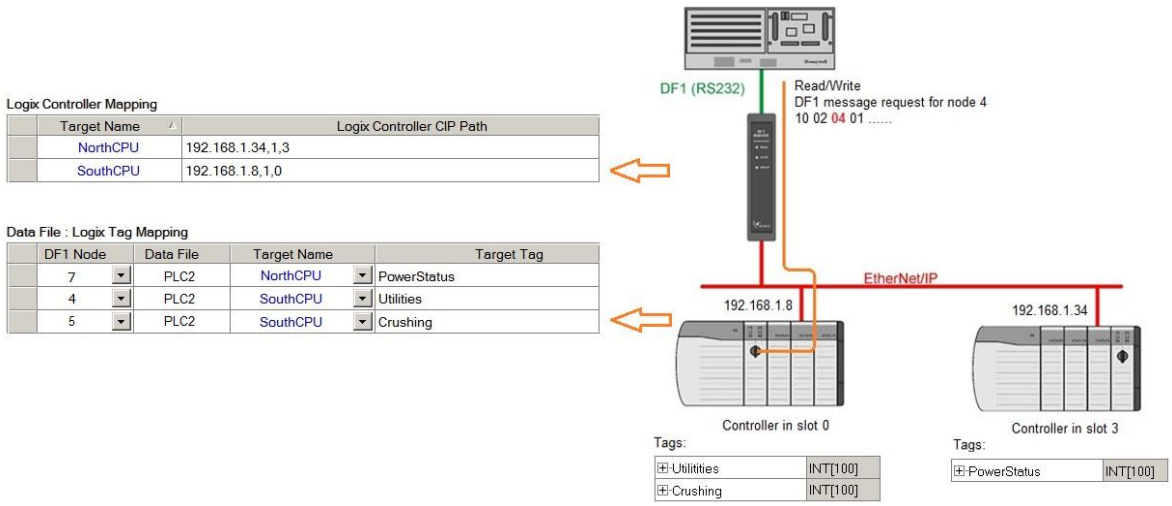


Figure 3.35 - DF1 Slave mode config in the PLX50 Configuration Utility (PLC2 messages)

3.5.3 Scheduled Tag Mode

The Scheduled Tag routing mode transfers data between a DF1 device and one or more Logix controllers. Unlike the Bridge and DF1 Slave mode, the PLX51-DF1-ENI when in the Scheduled Tag mode initiates the messaging.

In this mode, the PLX51-DF1-ENI transfers data between a Logix controller and a DF1 device without any configuration or programming required in either the DF1 device or the Logix controller.

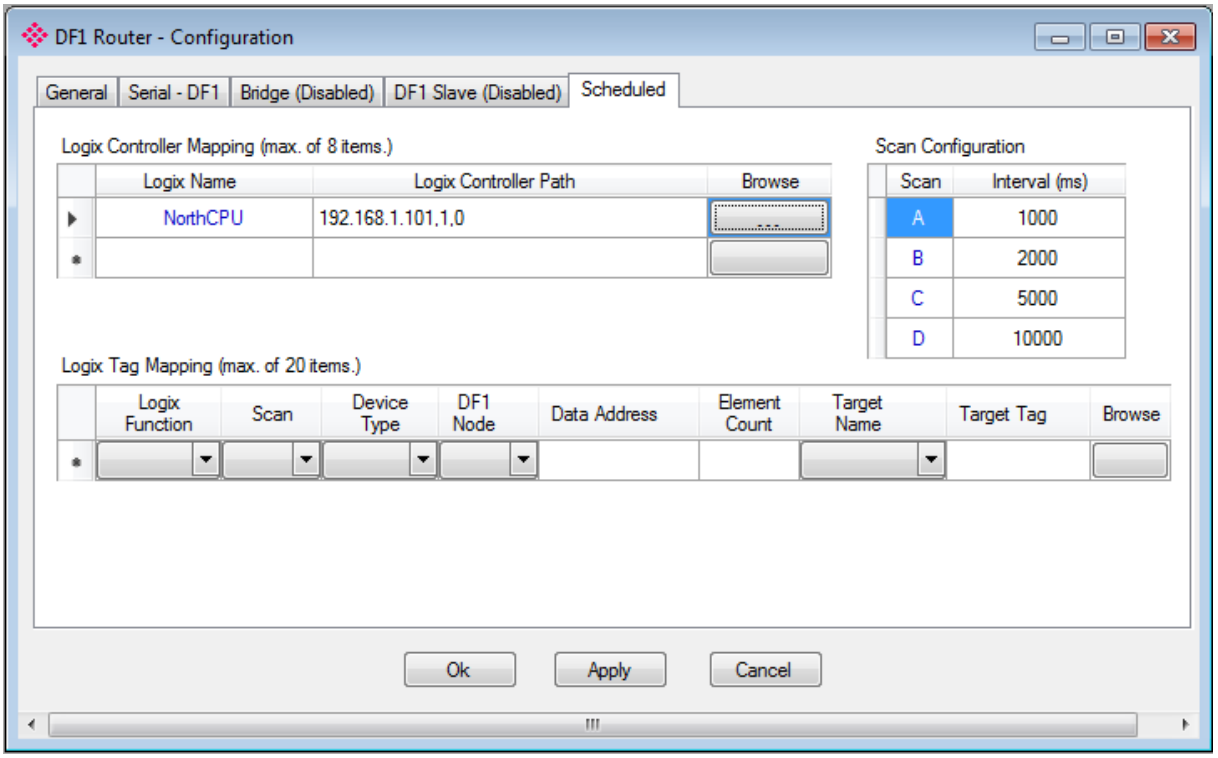


Figure 3.36 - Scheduled Tag configuration

The Schedule Tag mode is configured in three steps. First, you must create a Target Name (CIP path to the destination Logix controller) which will be used to link the DF1 File Number to the destination Logix tag.

The Logix controller paths can either be entered manually or you can browse to them by clicking the Browse button. The Target Browser opens and automatically scans for all available EtherNet/IP devices.

If the EtherNet/IP module is a bridge module, it can be expanded by right-clicking on the module and selecting the Scan option.

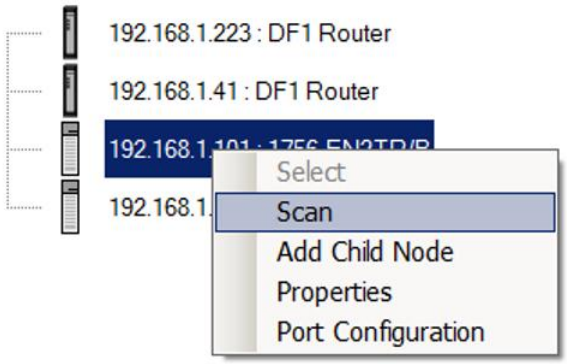


Figure 3.37 - Scanning node in the Target Browser`

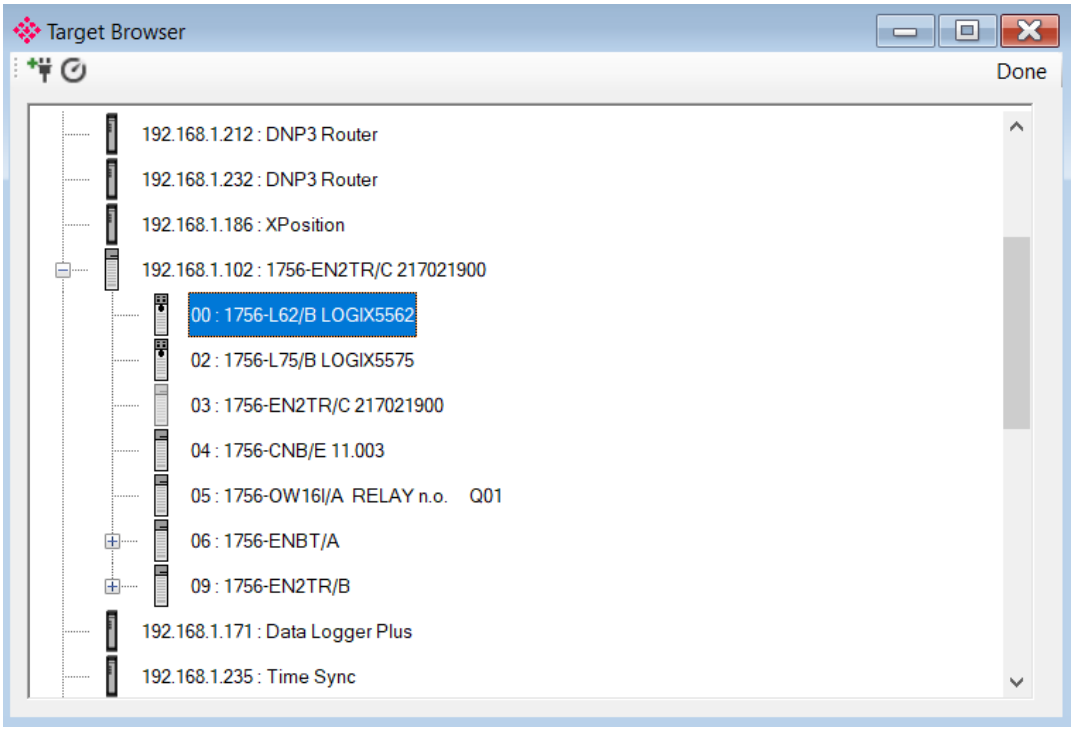


Figure 3.38 - Target Browser selection

The required Logix controller can then be chosen by selecting it and clicking the Ok button, or by double-clicking on the controller module.

A maximum number of 8 controller mapping entries can be added.

The second step is to configure the scan intervals. The scan intervals allow different data items to be transferred at different rates. There are 4 scan classes: A, B, C and D. The intervals for each can be adjusted by entering the scan time in milliseconds. The interval must be between 200 milliseconds and 60 seconds.

The third step is to configure the link between a DF1 node and File Number combination to a Logix tag, and the associated action and scan required.

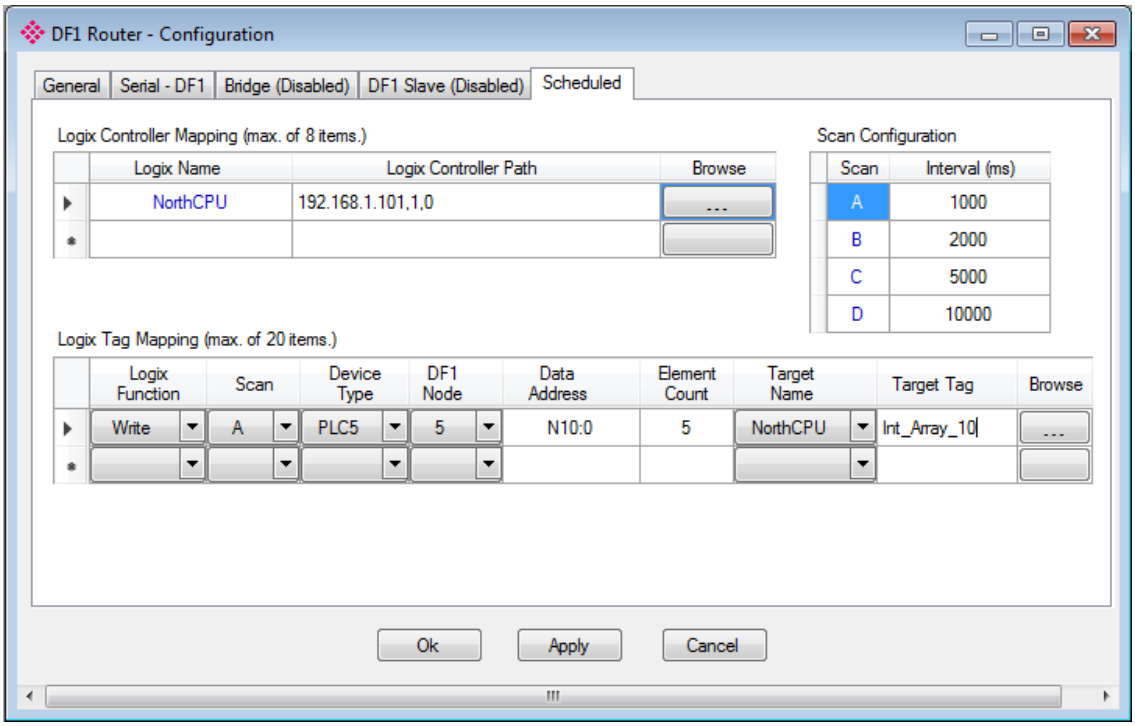


Figure 3.39 - Scheduled Tag Mapping

The Logix Function field specifies whether the transaction will result in a read or write from the Logix controller's perspective.

The Scan field specifies at what rate the transaction will be executed. Select a scan class letter that matches the required interval. Care must be taken to select a realistic scan interval, taking into account the configured Baud rate and message size.

The Device Type field specifies the type of message that will be sent to the DF1 device. There are two options: PLC5 and SLC. The latter should be selected when using a MicroLogix device.

The DF1 Node is the remote device's node.

The Data Address is the remote device's address and should be specified to the element level. For example, N10:0. Note that this differs from the DF1 Slave configuration where only the file is specified.

The Element Count is the number of items to be read or written. In the example above, with a Data Address of N10:0 and an Element Count of 5, then N10:0 through N10:4 will read from the DF1 device and written to Logix.

One of the Target Names configured in the first step can be selected by means of the target Name combo box.

The Target Tag can be either entered manually or selected using the Tag Browser in the PLX50 Configuration Utility. The Tag Browser requires the controller to be available on the network.

To browse to the tag, click on the Browse button. The Tag Browser opens and scans all the tags inside that controller. If the controller has been recently scanned in this session, then a cached version of the tags will be displayed. A rescan of the tags can be triggered by selecting the Refresh button in the Tag Browser's toolbar.

NOTE: When mapping PLC5 Boolean files (e.g. B3), it is recommended that the destination Logix tag be a SINT array, rather than a Boolean array. Using the latter may result in unexpected results due to the packing format of Logix Boolean arrays.

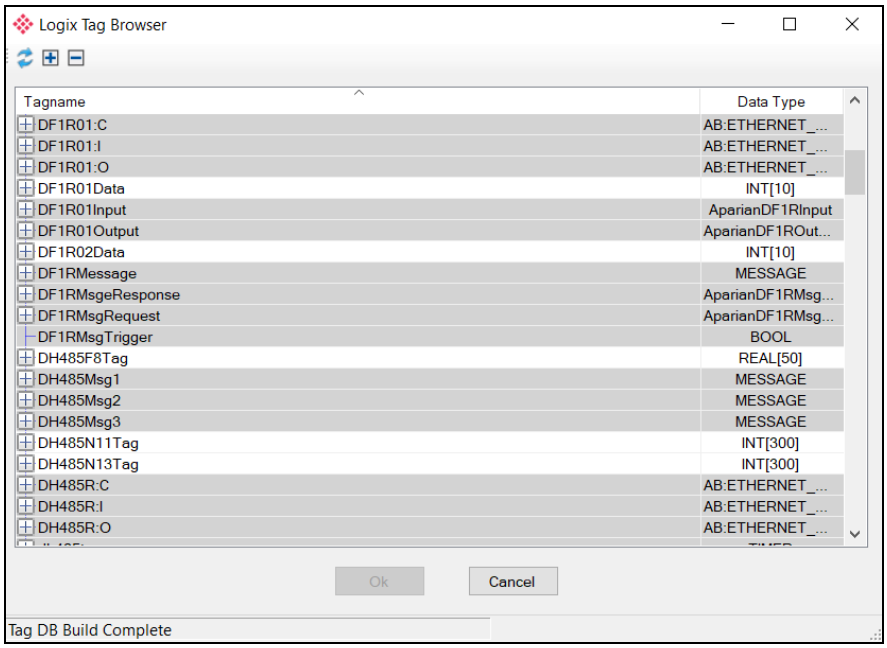


Figure 3.40 - Tag Browser tag selection

NOTE: It is your responsibility to ensure that the Logix tag array datatype and size matches that of the selected DF1 Data Address. Failing to do this can result in communication faults and unexpected results.

3.5.4 Unscheduled Mode

There is no additional configuration required when using the Unscheduled Mode. The configuration required for the DF1 message is contained within the Message Block data, configured in Logix.

3.6 Module Download

Once the DF1 configuration has been completed, it must be downloaded to the module.

Before downloading, the Connection Path of the module must be set. This path will automatically default to the IP address of the module, as set in the module configuration. It can be modified if the PLX51-DF1-ENI is not on a local network.

The Connection path can be set by right-clicking on the module and selecting the Connection Path option.

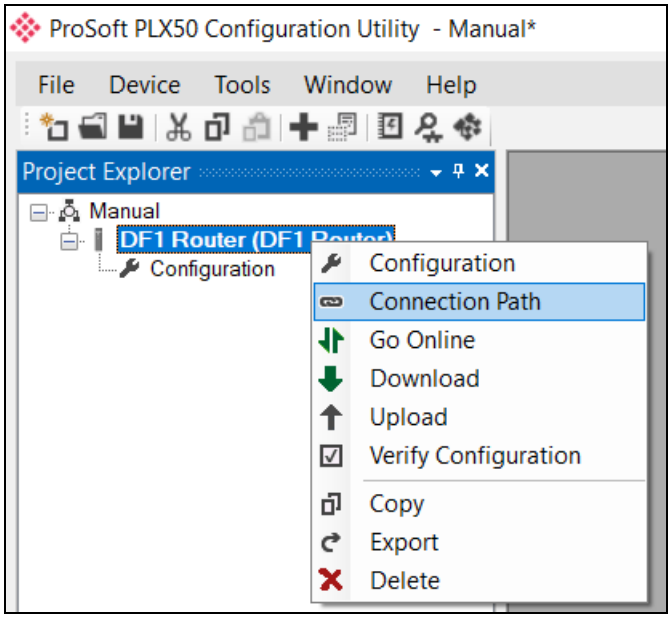


Figure 3.41 - Selecting Connection Path

The new connection path can then be either entered manually or selected by means of the Target Browser.

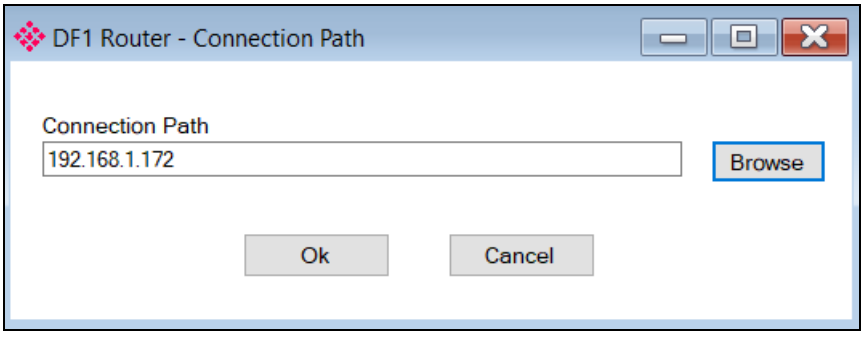


Figure 3.42 - Connection Path

To initiate the download, right-click on the module and select the Download option.

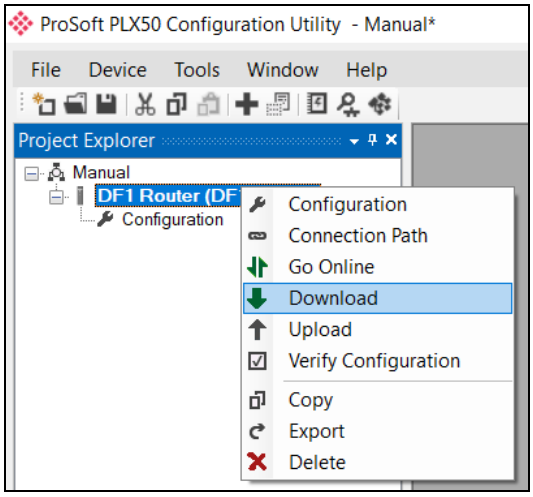


Figure 3.43 - Selecting Download

Once complete, you will be notified that the download was successful.

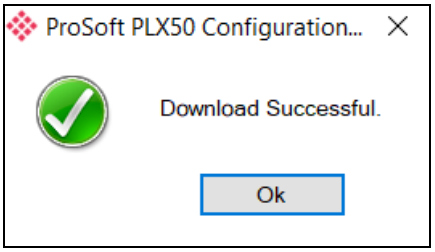


Figure 3.44 - Successful download

During the download process, the module's time will be compared to that of the PC's time. Should the difference be greater than 30 seconds, you will be prompted to set the module time to that of the PC time.

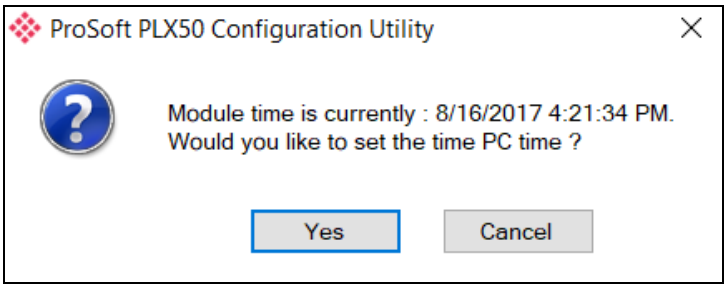


Figure 3.45 - Setting module time

The module time is used only for the event log.

Within the PLX50 Configuration Utility environment, the module will be in the Online state, indicated by the green circle around the module.

The module is now configured and will start operating immediately.

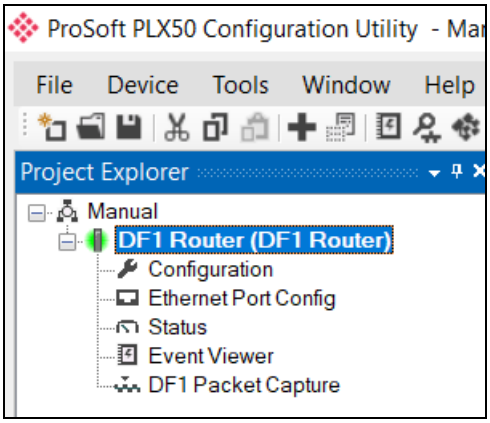


Figure 3.46 - Module online

3.7 RSLogix 5000 Configuration

The PLX51-DF1-ENI modules can be easily integrated with Allen-Bradley Logix family of controllers.

For Logix versions 20 and beyond, the modules can be added using the EDS Add-On-Profile (AOP), described in section 3.7.1.

There are 2 EDS files (EDS and NP EDS) for the PLX51-DF1-ENI. One supports routing using the DF1 protocol and the other supports EDS AOP in Logix (NP Suffix). Two EDS files exist because Studio 5000 does not decorate the AOP if there exists a Port Object or Legacy Port (required for DF1 routing).

- The EDS file supports routing to DF1. If the customer tries to upload this EDS file in RSLogix, the AOP will not work. This is the EDS stored in the module.
- The NP EDS file supports EDS AOP. This file will successfully create the EDS AOP in RSLogix. This file can be registered manually using the EDS Hardware Installation Tool.

Important: For older versions (19 and below), the module must be added using a Generic Profile described in section 3.7.2.

3.7.1 Studio 5000 Configuration (Version 20+)

The Logix family in Studio5000 uses the EDS AOP. Before the module can be added to the tree, the module's EDS file must be registered.

Using RSLinx, the EDS file can be uploaded from the device. The EDS Hardware Installation tool is then invoked to complete the registration.

Alternatively, the EDS file can be downloaded from the product web page at www.prosoft-technology.com. It can then be registered manually using the EDS Hardware Installation Tool shortcut, under the Tools menu in Studio 5000.

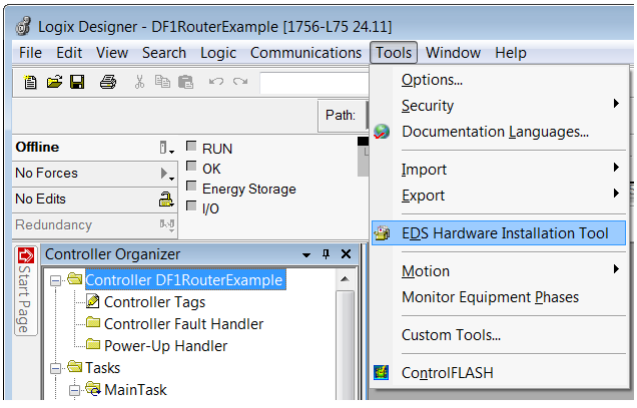


Figure 3.47 - EDS Hardware Installation Utility

After the EDS file has been registered, the module can be added to the Logix IO tree in Studio 5000. Under a Ethernet bridge module in the tree, select the Ethernet network, right-click and select the New Module option.

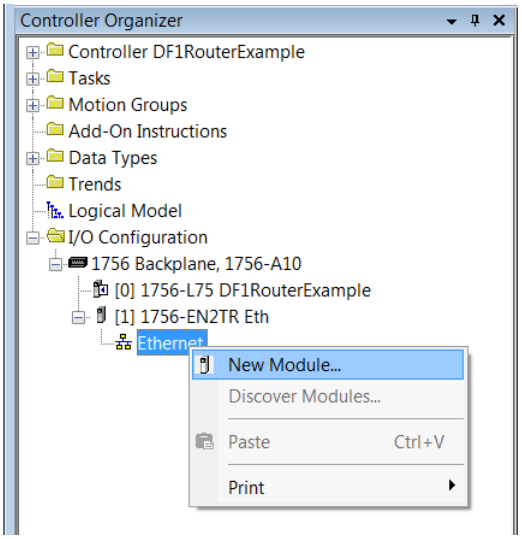


Figure 3.48 – Adding a module

The module selection dialog opens. To quickly find the module, use the Vendor filter to select the ProSoft Technology modules as shown in the figure below.

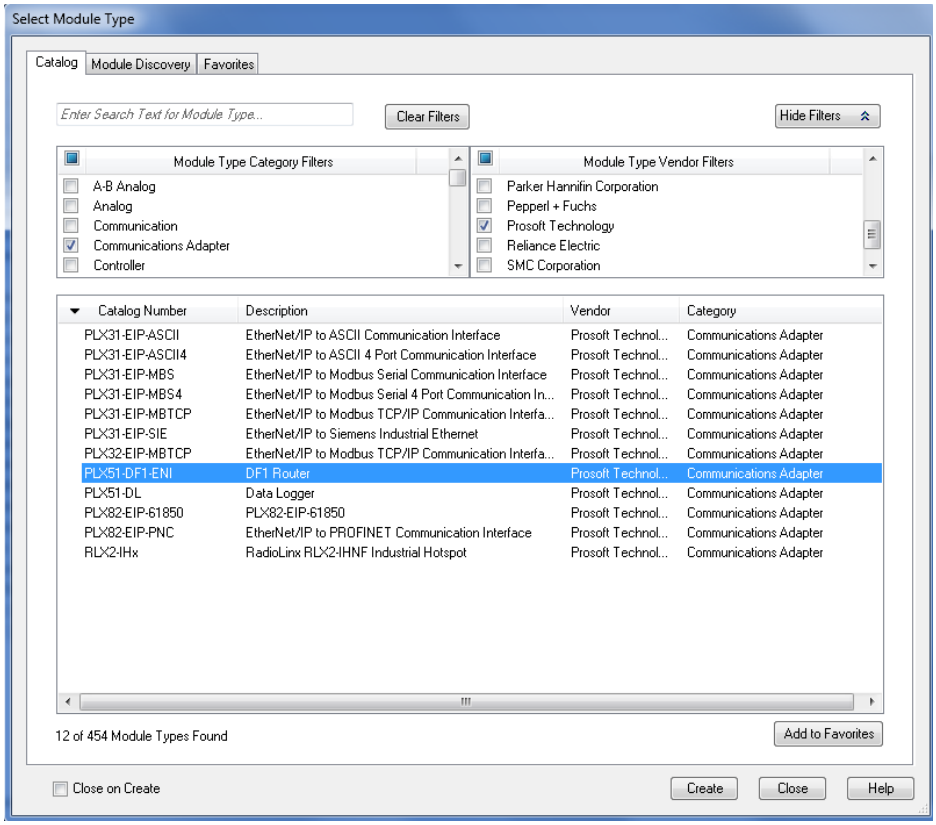


Figure 3.49 – Selecting the module

Locate and select the PLX51-DF1-ENI module, and select the ***Create*** option. The module configuration dialog opens, where you must specify the Name and IP address as a minimum to complete the instantiation.

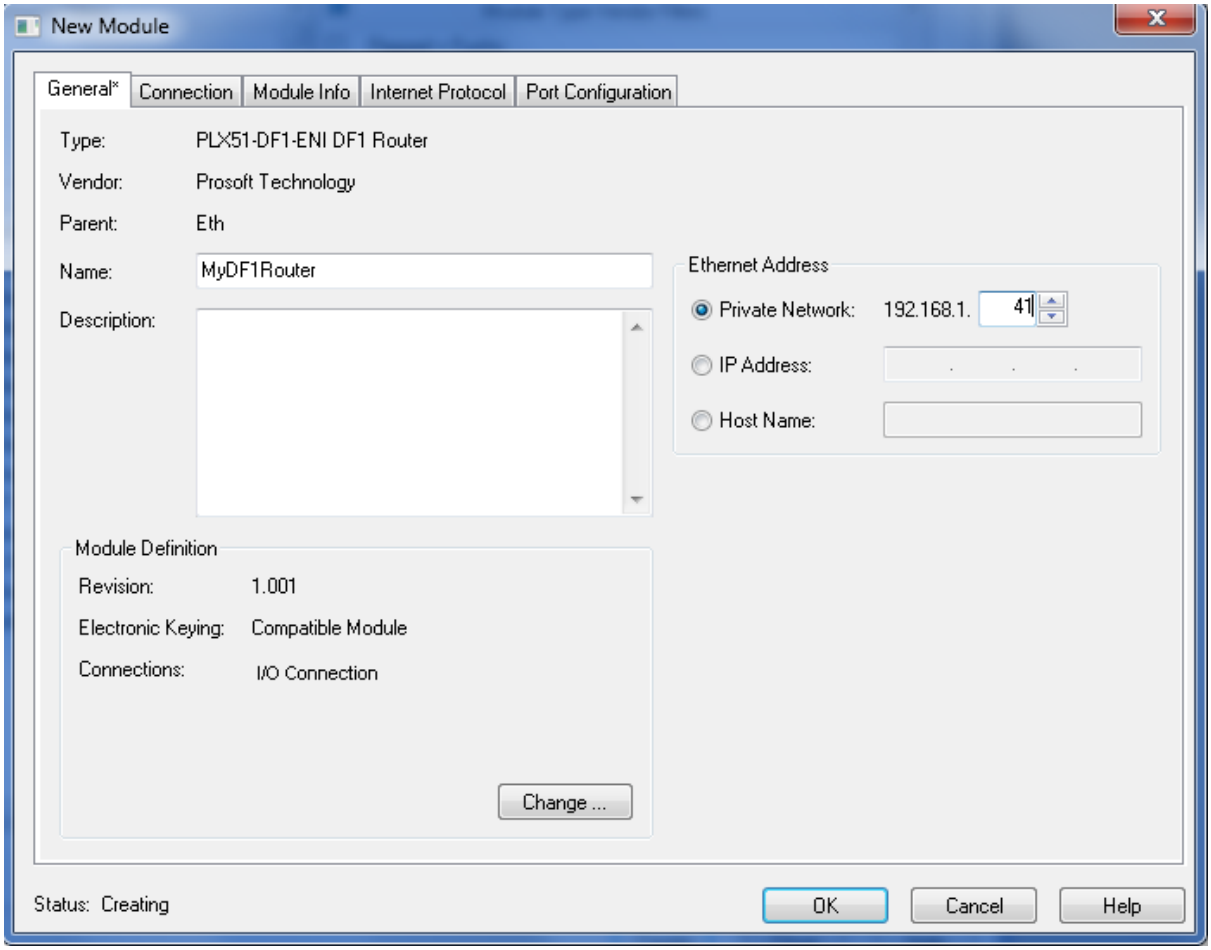


Figure 3.50 – Module instantiation

Once the instantiation is complete, the module appears in the Logix IO tree.

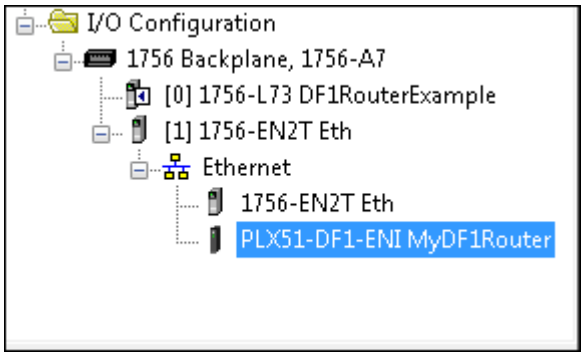


Figure 3.51 – Logix IO tree

The Module Defined Data Types are automatically created during the instantiation process. These data types provide meaningful structures to the module data. An excerpt of the Input Image is shown in the following figure:

MyDF1Router:I	{...}	{...}		_0135:PLX51_DF1_ENI_474676DF:I:0
MyDF1Router:I.ConnectionFaulted	0		Decimal	BOOL
MyDF1Router:I.InstanceNameLength	0		Decimal	DINT
MyDF1Router:I.Status	2#0000...		Binary	DINT
MyDF1Router:I.BridgeMode	0		Decimal	BOOL
MyDF1Router:I.DF1SlaveMode	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagMode	0		Decimal	BOOL
MyDF1Router:I.UnscheduledMode	0		Decimal	BOOL
MyDF1Router:I.ConfigurationValid	0		Decimal	BOOL
MyDF1Router:I.RoutingInhibited	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus0	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus1	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus2	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus3	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus4	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus5	0		Decimal	BOOL
...				
MyDF1Router:I.ScheduledTagStatus18	0		Decimal	BOOL
MyDF1Router:I.ScheduledTagStatus19	0		Decimal	BOOL
MyDF1Router:I.TransactionRate	0		Decimal	DINT
MyDF1Router:I.Temperature	0.0		Float	REAL
MyDF1Router:I.DF1RxPacketCount	0		Decimal	DINT
MyDF1Router:I.DF1TxPacketCount	0		Decimal	DINT
MyDF1Router:I.DF1ChecksumErrors	0		Decimal	DINT
MyDF1Router:I.PCCCRequests	0		Decimal	DINT
MyDF1Router:I.PCCCFailures	0		Decimal	DINT
MyDF1Router:I.TagReads	0		Decimal	DINT
MyDF1Router:I.TagWrites	0		Decimal	DINT
MyDF1Router:I.TagConnectionFailures	0		Decimal	DINT
MyDF1Router:I.TagErrors	0		Decimal	DINT

Figure 3.52 – Module Defined Data Type

3.7.2 RSLogix 5000 Configuration (Pre-Version 20)

Add Module to I/O Configuration

The module can operate in both a Logix “owned” and standalone mode. When the module operates in “owned” mode, the PLX51-DF1-ENI needs to be added to the RSLogix 5000 IO tree as a generic Ethernet module. This is done by right clicking on the Ethernet Bridge in the RSLogix 5000 and selecting *New Module*. Select the *ETHERNET-MODULE* as shown in the figure below.

NOTE: See the next section for importing the configuration (L5X).

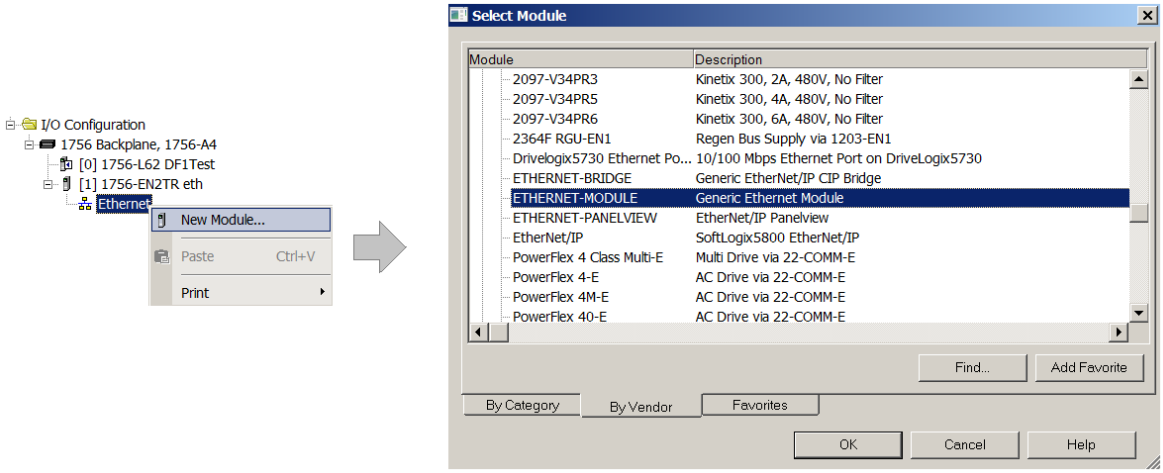


Figure 3.53 - Add a Generic Ethernet Module in RSLogix 5000

In the Module Properties dialog, enter the IP address, the assembly instance, and size for the input, output, and configuration. Below are the required connection parameters.

Connection Parameter	Assembly Instance	Size
Input	100	34 (32-bit)
Output	101	1 (32-bit)
Configuration	102	0 (8-bit)

Table 3.4 - RSLogix class 1 connection parameters for the PLX51-DF1-ENI

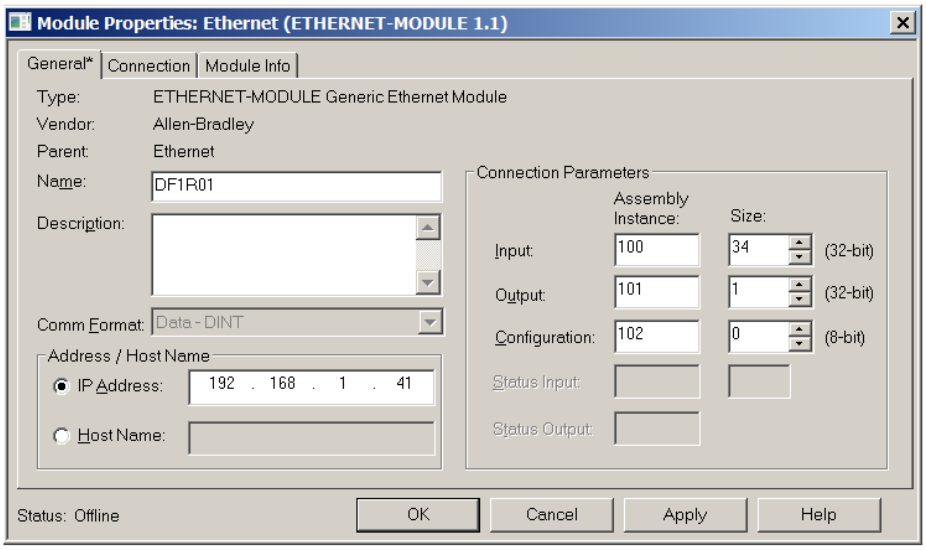


Figure 3.54 - RSLogix General module properties in RSLogix 5000

NOTE: You will need to enter the exact connection parameters before the module establishes a class 1 connection with the Logix controller.

Next, add the connection requested packet interval (RPI). This is the rate at which the input and output assemblies are exchanged. The recommended value is 500ms. Refer to the technical specification section in this document for further details on the limits of the RPI.

NOTE: Although the module can run with an RPI of 10ms, it is recommended to set the RPI to 500ms to avoid unnecessary loading of the module processor.

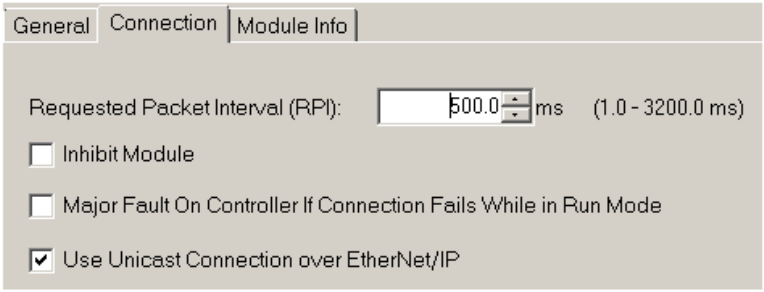


Figure 3.55 - Connection module properties in RSLogix 5000

Once the module has been added to the RSLogix 5000 IO tree, assign the User Defined Types (UDTs) to the input and output assemblies. You can import the required UDTs by right-clicking on *User-Defined* sub-folder in the *Data Types* folder of the IO tree, and selecting *Import Data Type*. The assemblies are then assigned to the UDTs with a ladder copy instruction (COP) as shown in the figure below.

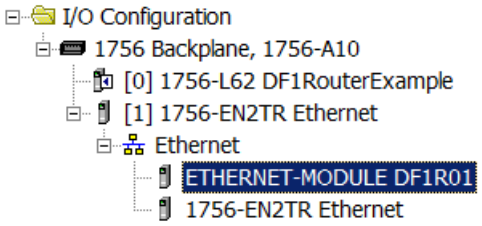


Figure 3.56 - RSLogix 5000 I/O module tree

Importing UDTs and Mapping Routines

To simplify the mapping of the input image, an RSLogix 5000 Routine Partial Import (L5X) file is provided.

This file can be imported by right-clicking on the required Program and selecting the Import Routine option.

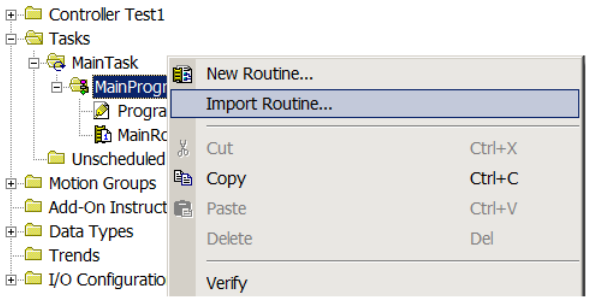


Figure 3.57 - RSLogix 5000 Importing DF1Router specific routine and UDTs

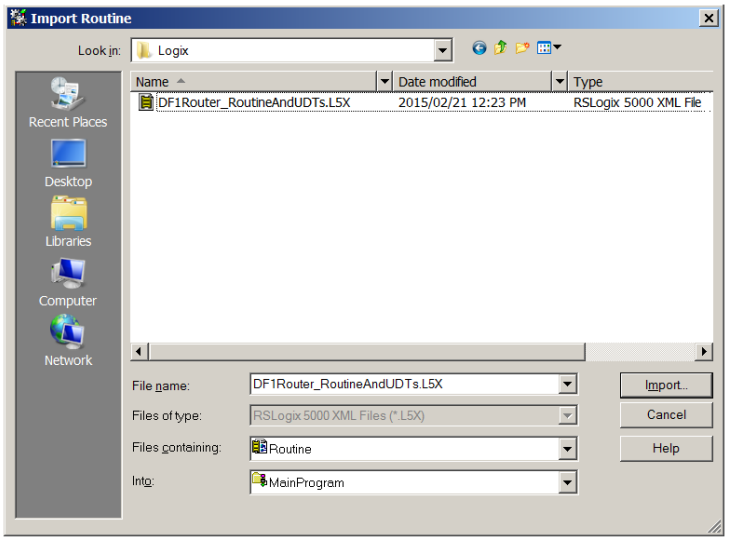


Figure 3.58 - Selecting partial import file

The import creates the following:

- The required UDTs (user defined data types)
- Two controller tags representing the Input and Output assemblies.
- A routine mapping the PLX51-DF1-ENI module to the aforementioned tags.
- An example Unscheduled Message instruction with the associated Tags

To change the routine to map to the correct PLX51-DF1-ENI module instance name, make sure that the mapping routine is called by the Program's Main Routine.

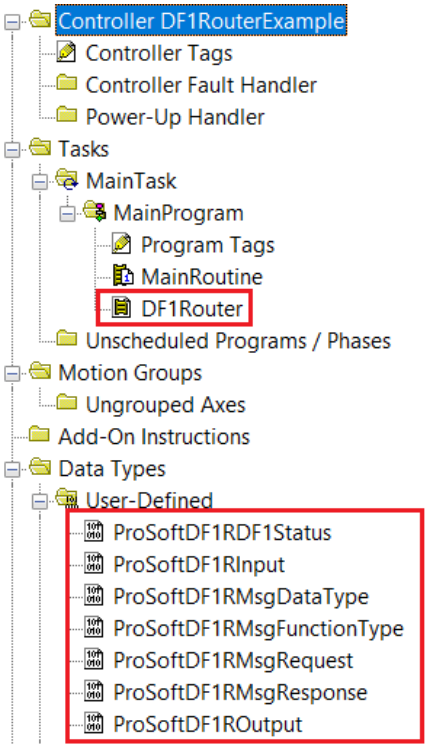


Figure 3.59 - Imported RSLogix 5000 objects

Refer to the additional information section of this document for an example RSLogix 5000 project, as well as the required UDTs.

4 Operation

4.1 Message Routing

When the PLX51-DF1-ENI has been set up, the DF1 message initiator sends a read/write to a DF1 address, then routed to a Logix tag. There are various indicators to determine if the mapping has routed the DF1 messages correctly. Refer to the diagnostics section for a more detailed explanation.

4.2 RSLogix 5000 Assemblies

When the module operates in a Logix “owned” mode, the Logix controller establishes a class 1 cyclic communication connection with the PLX51-DF1-ENI. A input and output assembly is exchanged at a fixed interval. The UDTs convert the input and output arrays into tag-based assemblies. Refer to the additional information section in this document for the input and output UDTs.

DF1R01Input	{...}	{...}		ProSoftDF1RInput
DF1R01Input.Instance	'South'	{...}		STRING
DF1R01Input.Status	{...}	{...}		ProSoftDF1RDF1Status
DF1R01Input.TransactionRate	31		Decimal	DINT
DF1R01Input.Temperature	46.3		Float	REAL
DF1R01Input.DF1RxPacketCount	34218		Decimal	DINT
DF1R01Input.DF1TxPacketCount	34217		Decimal	DINT
DF1R01Input.DF1ChecksumErrors	0		Decimal	DINT
DF1R01Input.PCCCRequests	0		Decimal	DINT
DF1R01Input.PCCCFailures	0		Decimal	DINT
DF1R01Input.TagReads	16522		Decimal	DINT
DF1R01Input.TagWrites	587		Decimal	DINT
DF1R01Input.TagConnectionFailures	0		Decimal	DINT
DF1R01Input.TagErrors	0		Decimal	DINT

Figure 4.1 – Input assembly UDT structure

4.2.1 Input Assembly

The following parameters are used in the input assembly of the module.

Parameter	Datatype	Description
Instance	STRING	The instance name of the module that was configured under the general DF1 configuration in the PLX50 Configuration Utility.
Status.BridgeMode	BOOL	Set if the module is operating in Bridge mode.
Status.ReactiveTagMode	BOOL	Set if the module is operating in DF1 Slave mode.
Status.ScheduledTagMode	BOOL	Set if the module is operating in Scheduled Tag mode.
Status.UnscheduledMode	BOOL	Set if the module is operating in Unscheduled mode.
Status.ConfigurationValid	BOOL	Set if a valid configuration is executing in the module.
Status.RoutingInhibited	BOOL	Set when the module's routing function has been inhibited. Routing can be inhibited by setting a bit in the output assembly of the module.
Status.ScheduledTagStatus0…19	BOOL[20]	Each bit represents the status of the last scheduled transaction for that specific map item. A true value indicates success.
TransactionRate	DINT	The transaction rate is the number of DF1 messages per second that the module is currently routing.
DeviceTemperature	REAL	The internal temperature of the module.
DF1RxPacketCount	DINT	The total number of DF1 packets received by the module.
DF1TxPacketCount	DINT	The number of DF1 packets sent by the module.
DF1ChecksumErrors	DINT	The number of corrupted DF1 packets received by the module.
PCCCRequests	DINT	The total number of DF1 message routing requests received by the module when operating in Bridge mode.
PCCCFailures	DINT	The total number of DF1 message routing requests resulted in errors when operating in Bridge mode.
TagReads	DINT	The total number of tag reads executed by the module when operating in Tag Map mode.
TagWrites	DINT	The total number of tag writes executed by the module when operating in Tag Map mode.
TagConnectionFailures	DINT	The number of failed class 3 connection attempts when operating in Tag Map mode. Tag reading and writing requires the module to first establish a class 3 connection with the Logix Controller.
TagErrors	DINT	The number of failed tag access (read/write) requests when operating in tag Map mode. These may include privileged violations, non-existing tags, etc.

Table 4.1 - RSLogix 5000 input assembly parameters

4.2.2 Output Assembly

The following parameters are used in the output assembly of the module.

Parameter	Datatype	Description
CONTROL	DINT	In the NP EDS file, this tag is used to host the Routing inherit Bool under it, so when you set the inhibit tag to 1, the corresponding bit in the CONTROL tag will also be set.
RoutingInhibit	BOOL	This bit inhibits the module's routing capabilities. When set, no DF1 messages are routed. This may be required in applications running a redundant DF1 network where one of the PLX51-DF1-ENIs is to run in a hot-standby mode.

Table 4.2 - RSLogix 5000 output assembly parameters

4.1 Unscheduled Messaging

When the PLX51-DF1-ENI is configured in Unscheduled Mode, it processes DF1 message requests sent from Logix via a message instruction.

To simplify the configuration of the required message, a number of UDTs have been preconfigured. They are available on the ProSoft Technology website.

Example:

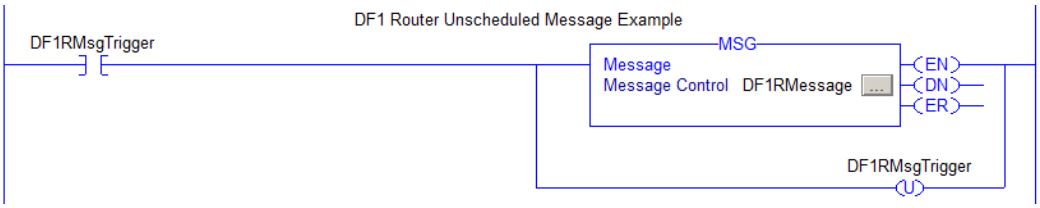


Figure 4.2 - Message Instruction

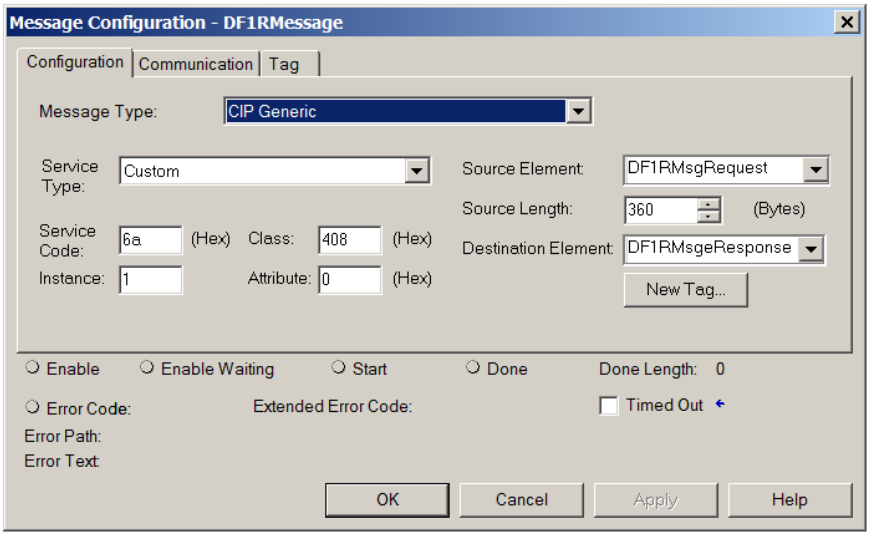


Figure 4.3 - Message Configuration

Parameter	Description
Message Type	CIP Generic
Service Type	Custom
Service Code	6A (Hex) - Unscheduled DF1 Pass-through
Class	408 (Hex)
Instance	1
Attribute	0
Source Element	The request tag instance. It must follow the structure of the *ProSoftDF1RMsgRequest* UDT.
Source Length	360
Destination Element	The response tag instance. It must follow the structure of the *ProSoftDF1RMsgResponse* UDT.

Table 4.3 - Message Configuration Paramaters

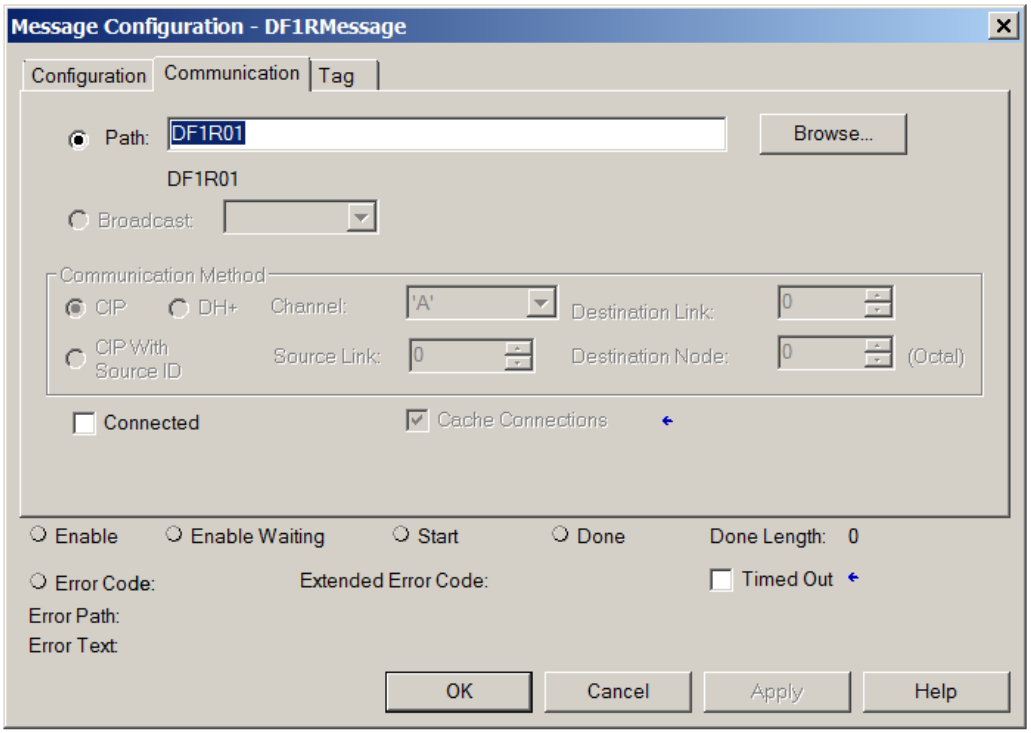


Figure 4.4 - Messsage Configuration - Communication

The Path must be configured to that of the PLX51-DF1-ENI. If the PLX51-DF1-ENI has been added in the I/O tree, the Browse option can be used to select the path.

Alternatively, enter the CIP path in the format:
1,X,2,IP

Where:

1 represents the backplane port,
X represents the slot of the Ethernet bridge module,
2 represents the Ethernet port of the Ethernet bridge module,
IP represents the IP address of the PLX51-DF1-ENI.
e.g. **1,1,2,192.168.1.41**

The request tag (e.g. DF1RMsgrequest) should be configured as:

DF1RMsgRequest	{...}	{...}		ProSoftDF1RMsgRequest
DF1RMsgRequest.DestinationNode	5		Decimal	SINT
DF1RMsgRequest.DF1DataFileAddress	'N10:0'	{...}		STRING
DF1RMsgRequest.Function	{...}	{...}		ProSoftDF1RMsgFunctionType
DF1RMsgRequest.Function.PLC5TypedRead	1		Decimal	BOOL
DF1RMsgRequest.Function.PLC5TypedWrite	0		Decimal	BOOL
DF1RMsgRequest.Function.SLCTypedRead	0		Decimal	BOOL
DF1RMsgRequest.Function.SLCTypedWrite	0		Decimal	BOOL
DF1RMsgRequest.DataType	{...}	{...}		ProSoftDF1RMsgDataType
DF1RMsgRequest.DataType.BOOLEAN	0		Decimal	BOOL
DF1RMsgRequest.DataType.INT	1		Decimal	BOOL
DF1RMsgRequest.DataType.REAL	0		Decimal	BOOL
DF1RMsgRequest.ElementCount	16		Decimal	INT
DF1RMsgRequest.RequestData	{...}	{...}	Decimal	INT[128]

Figure 4.5 - Unscheduled Message Request Tag

Parameter	Description
Destination Node	The DF1 node address of the destination device.
Data File Address	A string representing the Data File Address of the destination DF1 device. Example: N10:0
Function	Set the bit of the function required: PLC5 Typed Read PLC5 Typed Write SLC Typed Read SLC Typed Write Only one function can be set.
Data Type	Set the bit of the destination Data Type: Boolean Int (integer) Real (float) Only one function can be set.
Element Count	The number of destination elements defined in the Data Type field.
Request Data	The Data array (expressed as an INT array) to be written to the destination node. This field is ignored for Read functions.

Table 4.4 - Unscheduled Message Request Parameters

DF1RMsgeResponse	{...}	{...}		ProSoftDF1RMsgResponse
DF1RMsgeResponse.Status	0		Decimal	INT
DF1RMsgeResponse.ResponseLength	0		Decimal	INT
DF1RMsgeResponse.ResponseData	{...}	{...}	Decimal	INT[128]

Figure 4.6 - Unscheduled Message Response Tag

Parameter	Description
Status	The status returned by the destination DF1 device. A value of zero indicates success.
Response Length	The number of bytes returned by the destination DF1 device.
Response Data	The data response from the destination DF1 device expressed as an INT array.

Table 4.5 - Unscheduled Message Response Parameters

After the message has been successfully executed (Msg.DN), the Response Data should be copied (using a COP instruction) to the required Data Tag of an appropriate data type.

5 Diagnostics

5.1 LEDs

The PLX51-DF1-ENI provides three LEDs for diagnostic purposes as shown below.

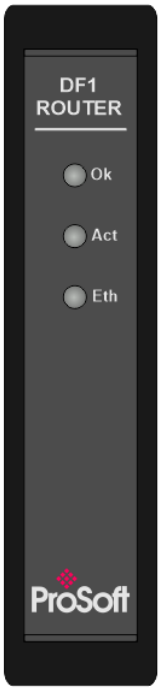


Figure 5.1 - PLX51-DF1-ENI front view

LED	Description
Module	The Module LED provides information regarding the system-level operation of the module. If the LED is red, the module is not operating correctly. For example, if the module application firmware has been corrupted or there is a hardware fault the module will have a red Module LED. If the LED is green, then the module has booted and is running correctly.
Activity	The Activity LED is used for the RS232 serial port. Thus, every time a successful DF1 packet is received, the LED will toggle green. The LED toggles red if a corrupted packet was received (eg. failed checksum).
Ethernet	The Ethernet LED lights up when an Ethernet link has been detected (by plugging in a connected Ethernet cable). The LED flashes every time traffic was detected.

Table 5.1 - Module LED operation

5.2 Module Status Monitoring

The PLX51-DF1-ENI provides a range of statistics that can assist with module operation, maintenance, and diagnostics. The statistics can be accessed in full by the PLX50 Configuration Utility or using the web server in the module.

To view the module's status in the ProSoft PLX50 Configuration Utility, the module must be online. Right-click on the module and select the *Go Online* option.

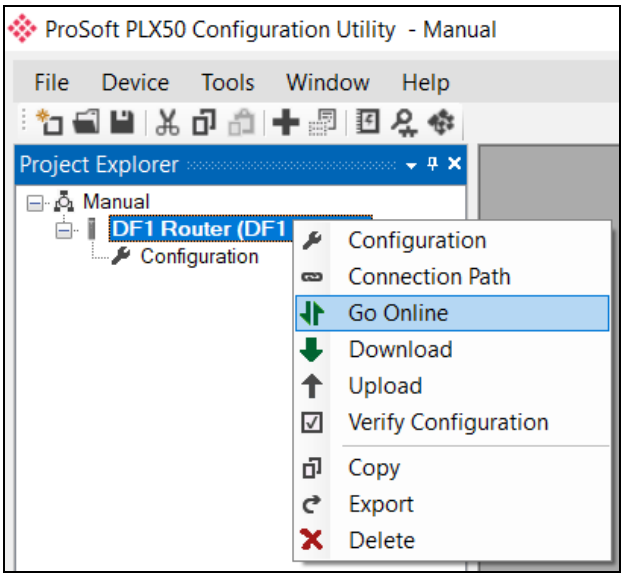


Figure 5.2 - Selecting to Go Online

The Online mode is indicated by the green circle behind the module icon in the Project Explorer tree.

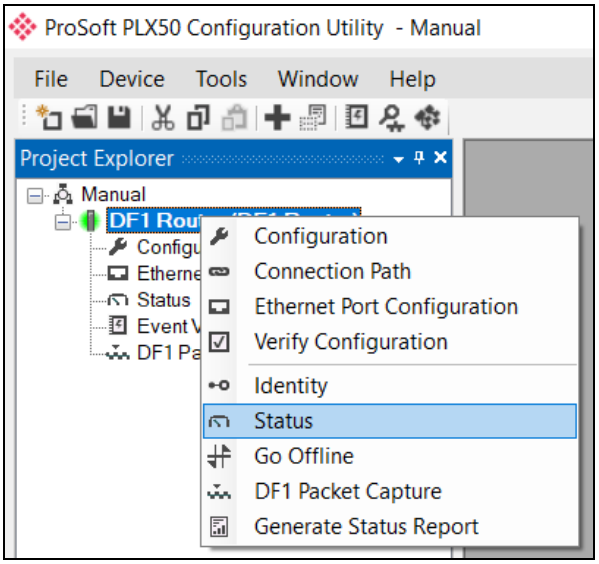


Figure 5.3 - Selecting online Status

The Status monitoring window can be opened by either double-clicking on the *Status* item in the Project Explorer tree, or by right-clicking on the module and selecting *Status*.

The status window contains multiple tabs to display the current status of the module.

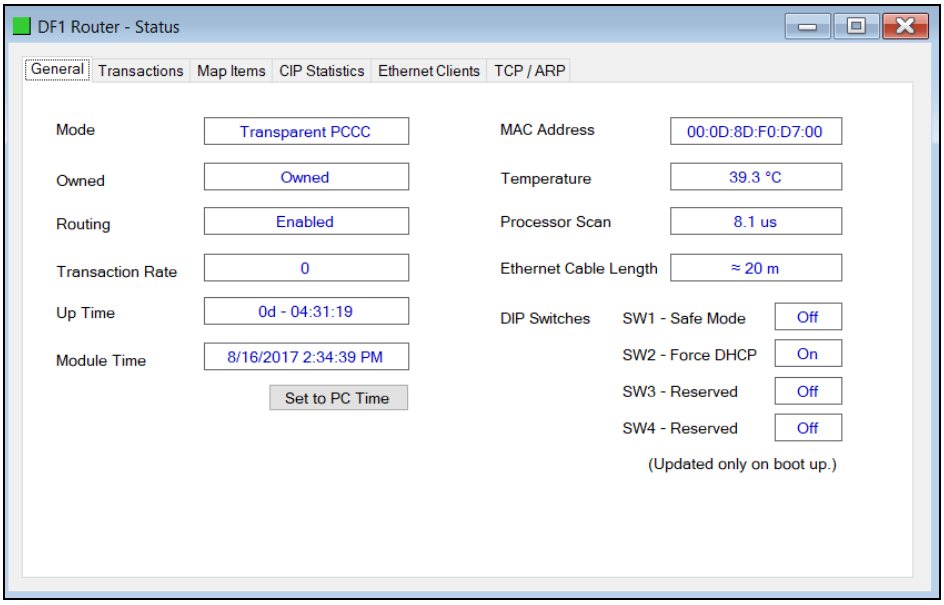


Figure 5.4 - Status monitoring - General

The General tab displays the following general parameters. It can also be used to set the module time to the PC time:

Parameter	Description
Mode	Indicates the current operating mode: Bridge, DF1 Slave, Scheduled Tag, or Unscheduled.
Owned	Indicates if the module is currently owned (Class 1) by a Logix controller.
Routing	Indicates whether the routing of module is enabled or inhibited. The routing operation can be inhibited in the output assembly of the module.
Transaction Rate	The number of DF1 messages per second that the module is currently routing.
Up Time	Indicates the elapsed time since the module was powered-up.
Module Time	Indicates the module's internal time. The module time is stored in UTC (Universal Coordinate Time) but displayed on this page according to the local PC Time Zone settings.
MAC Address	Displays the module's unique Ethernet MAC address.
Temperature	The internal temperature of the module.
Processor Scan	The amount of time (microseconds) of the module's processor in the last scan.
DIP Switch Position	The status of the DIP switches when the module booted. Note that this status will not change if the DIP switches are altered when the module is running.

Table 5.2 - Parameters displayed in the Status Monitoring – General Tab

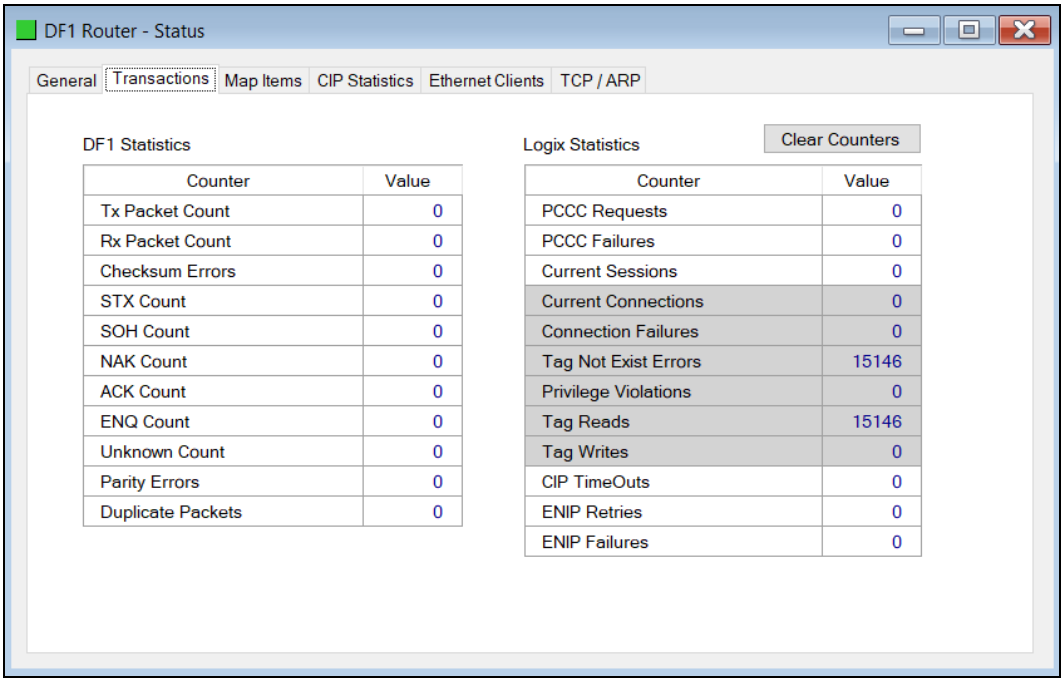


Figure 5.5 - Status monitoring - Transactions

The Transactions tab displays the statistics associated with the following:

- DF1 messages
- PCCC messages (Bridge and Scheduled Tag Mode)
- Logix Tag Mapping (DF1 Slave and Scheduled Tag Mode)

Statistic	Description
Tx Packet Count	The number of DF1 packets sent by the module.
Rx Packet Count	The number of DF1 packets received by the module.
Checksum errors	The number of corrupted DF1 packets received by the module.
STX count	The number of DF1 STX (Start of Text) delimiters received by the module.
SOH count	The number of DF1 SOH (Start of Header) delimiters received by the module.
NAK count	The number of NAK (Negative Acknowledge) DF1 packets received by the module.
ACK count	The number of ACK (Acknowledge) DF1 packets received by the module.
ENQ count	The number of ENQ (Enquiry) DF1 packets received by the module.
Unknown count	The number of unknown packets received by the module.
Parity errors	The number of bytes with parity errors received by the module.
Duplicate packet count	The number of duplicate packets received by the module.

Table 5.3 – DF1 statistics

The following PCCC statistics are only relevant when the module is running in either Bridge or Unscheduled mode.

Statistic	Description
PCCC Requests	The number of EtherNet/IP PCCC requests that have been sent to a Logix controller.
PCCC Failures	The number of failed EtherNet/IP PCCC responses that have been received by the PLX51-DF1-ENI from a Logix controller.
Current Sessions	The current number of open EtherNet/IP PCCC sessions.

Table 5.4 - PCCC statistics

The following Tag Mapping statistics are only relevant when the module is running in either DF1 Slave or Scheduled Tag mode.

Statistic	Description
Current Connections	The number of current open class 3 connections.
Connection Failures	The number of failed attempts at establishing a class 3 connection with a Logix controller.
Tag Not Exist Errors	The number of tag read and tag write transactions that failed due to the destination tag not existing.
Privilege Violation Errors	The number of tag read and tag write transactions that failed due to a privilege violation error. This may be caused by the External Access property of the Logix tag being set to either None or Read Only.
Tag Reads	The number of tag read transactions executed by the PLX51-DF1-ENI module.
Tag Writes	The number of tag write transactions executed by the PLX51-DF1-ENI module.
CIP Timeout	This count increases when no response was received for the Tag Read/Write.
ENIP Retries	This count increases when no response was received from the Logix Controller by the time the ENIP timeout is reached.
ENIP Failures	This count increases when the ENIP Retry Limit is reached, and no response has been received from the Logix Controller.

Table 5.5 - Tag Mapping statistics

The Map Items tab displays the successful packet counts processed by each mapping item. If an item count changes, the success count field will be displayed with a green background for approximately 3 seconds. This provides quick visual feedback of the currently active items.

The fields in the Map Items tab adjust to suite the appropriate mode. No items are displayed in Unscheduled mode.

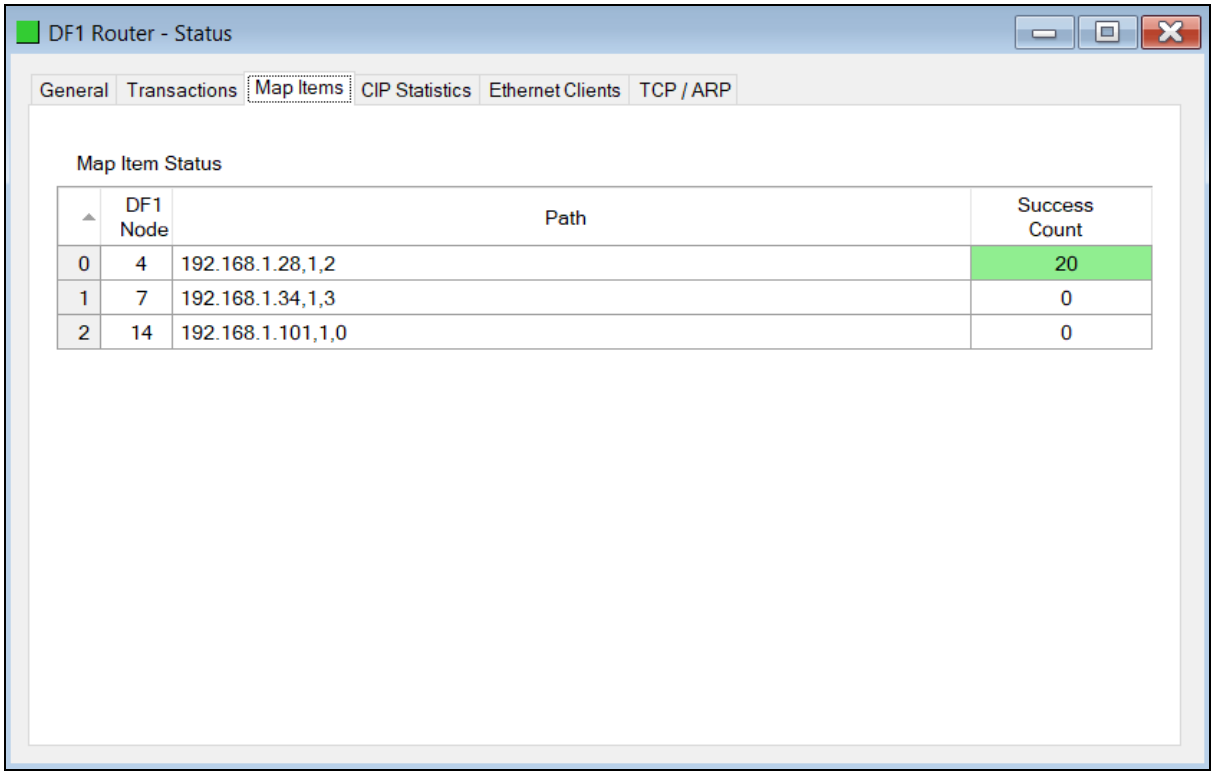


Figure 5.6 - Map Item status

5.3 DF1 Packet Capture

The module provides the capability to capture the DF1 traffic for analysis.

To invoke the capture of the module, double-click on the DF1 Packet Capture item in the Project Explorer tree.

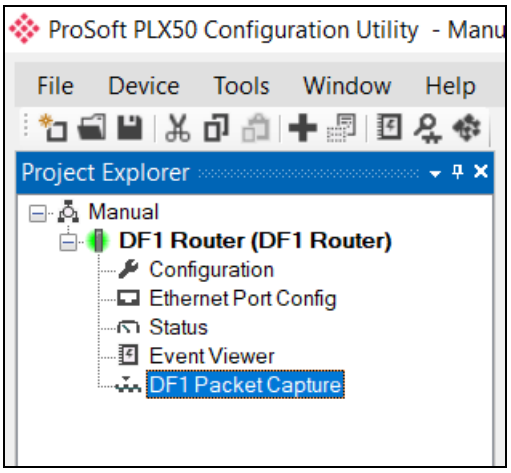


Figure 5.7 - Selecting DF1 Packet Capture

The DF1 Packet Capture window opens and automatically starts capturing all DF1 packets.

NOTE: The module keeps a circular buffer of the last 20 DF1 packets, and thus there may be up to 20 packets in the capture that were received / sent before the capture was initiated.

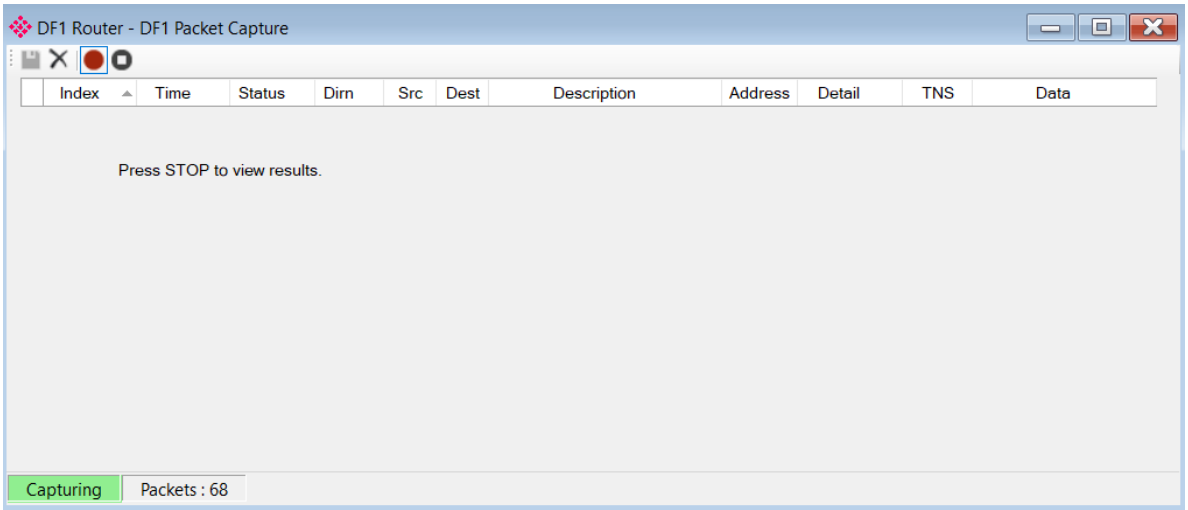
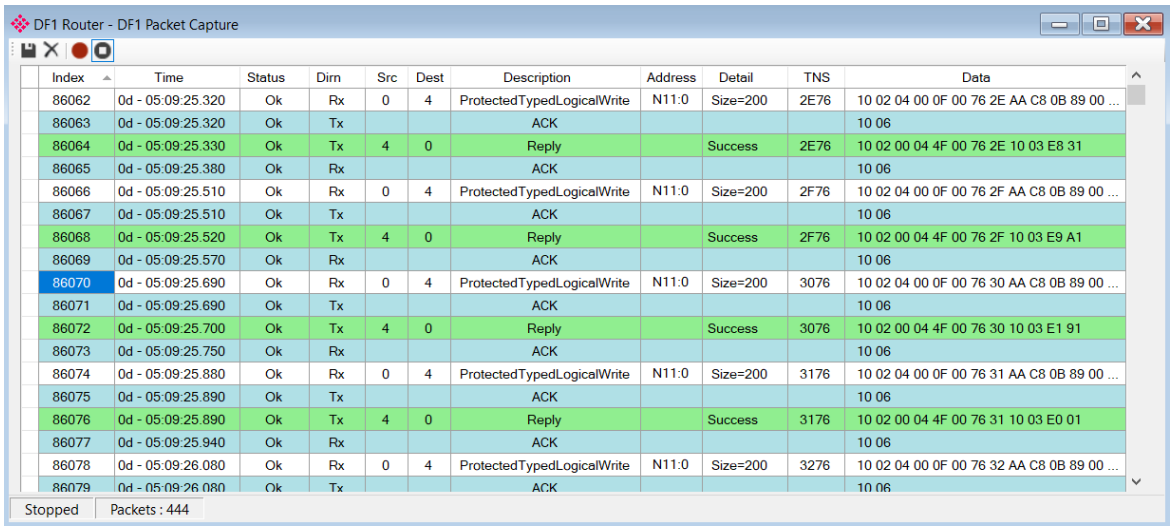


Figure 5.8 - DF1 packet capture

To display the captured DF1 packets, the capture process must first be stopped by pressing the Stop button.



Index	Time	Status	Dirn	Src	Dest	Description	Address	Detail	TNS	Data
86062	0d - 05:09:25.320	Ok	Rx	0	4	ProtectedTypedLogicalWrite	N11:0	Size=200	2E76	10 02 04 00 0F 00 76 2E AA C8 0B 89 00 ...
86063	0d - 05:09:25.320	Ok	Tx			ACK				10 06
86064	0d - 05:09:25.330	Ok	Tx	4	0	Reply		Success	2E76	10 02 00 04 4F 00 76 2E 10 03 E8 31
86065	0d - 05:09:25.380	Ok	Rx			ACK				10 06
86066	0d - 05:09:25.510	Ok	Rx	0	4	ProtectedTypedLogicalWrite	N11:0	Size=200	2F76	10 02 04 00 0F 00 76 2F AA C8 0B 89 00 ...
86067	0d - 05:09:25.510	Ok	Tx			ACK				10 06
86068	0d - 05:09:25.520	Ok	Tx	4	0	Reply		Success	2F76	10 02 00 04 4F 00 76 2F 10 03 E9 A1
86069	0d - 05:09:25.570	Ok	Rx			ACK				10 06
86070	0d - 05:09:25.690	Ok	Rx	0	4	ProtectedTypedLogicalWrite	N11:0	Size=200	3076	10 02 04 00 0F 00 76 30 AA C8 0B 89 00 ...
86071	0d - 05:09:25.690	Ok	Tx			ACK				10 06
86072	0d - 05:09:25.700	Ok	Tx	4	0	Reply		Success	3076	10 02 00 04 4F 00 76 30 10 03 E1 91
86073	0d - 05:09:25.750	Ok	Rx			ACK				10 06
86074	0d - 05:09:25.880	Ok	Rx	0	4	ProtectedTypedLogicalWrite	N11:0	Size=200	3176	10 02 04 00 0F 00 76 31 AA C8 0B 89 00 ...
86075	0d - 05:09:25.890	Ok	Tx			ACK				10 06
86076	0d - 05:09:25.890	Ok	Tx	4	0	Reply		Success	3176	10 02 00 04 4F 00 76 31 10 03 E0 01
86077	0d - 05:09:25.940	Ok	Rx			ACK				10 06
86078	0d - 05:09:26.080	Ok	Rx	0	4	ProtectedTypedLogicalWrite	N11:0	Size=200	3276	10 02 04 00 0F 00 76 32 AA C8 0B 89 00 ...
86079	0d - 05:09:26.080	Ok	Tx			ACK				10 06

Figure 5.9 - DF1 Packet Capture complete

The captured DF1 packets are tabulated as follows:

Statistic	Description
Index	The packet index, incremented for each packet sent or received.
Time	The elapsed time since the module powered up.
Status	The status of the packet. Received packets are checked for valid DF1 constructs and valid checksums.
Dirn	The direction of the packet, either transmitted (Tx) or received (Rx).
Src	DF1 node address of the message source.
Dest	DF1 node address of the message destination.
Description	Brief description of the packet, usually the command.
Address	The string representing a PLC data address, where applicable.
Detail	Additional details associated with command.
TNS	Transaction number. Used to match request and reply messages.
Data	The packet's raw data displayed in space delimited hex.

Table 5.6 - DF1 Packet Capture fields

The packet capture can be saved to a file for further analysis by selecting the Save button on the toolbar. Previously saved DF1 Packet Capture files can be viewed by selecting the DF1 Packet Capture Viewer option in the tools menu.

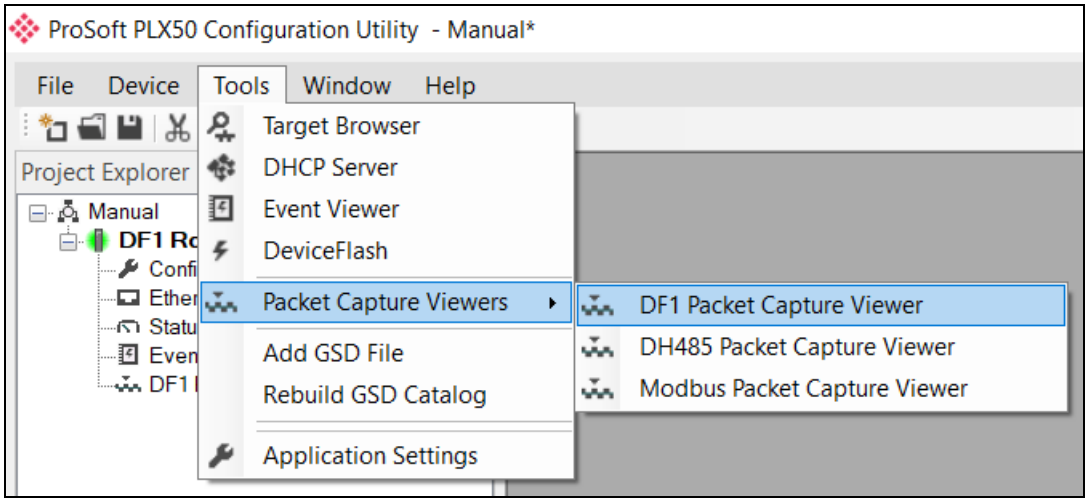


Figure 5.10 - Selecting the DF1 Packet Capture Viewer

5.4 Module Event Log

The PLX51-DF1-ENI module logs various diagnostic records to an internal event log. These logs are stored in non-volatile memory and can be displayed using the PLX50 Configuration Utility or via the web interface. To view them in the PLX50 Configuration Utility, select the Event Viewer option in the Project Explorer tree.

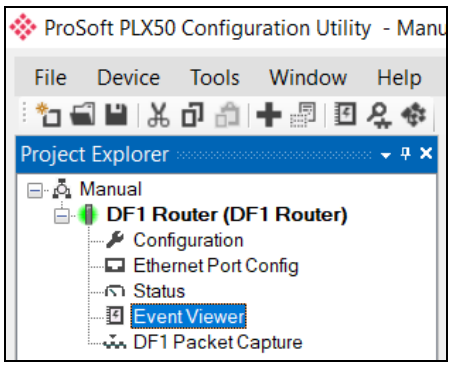
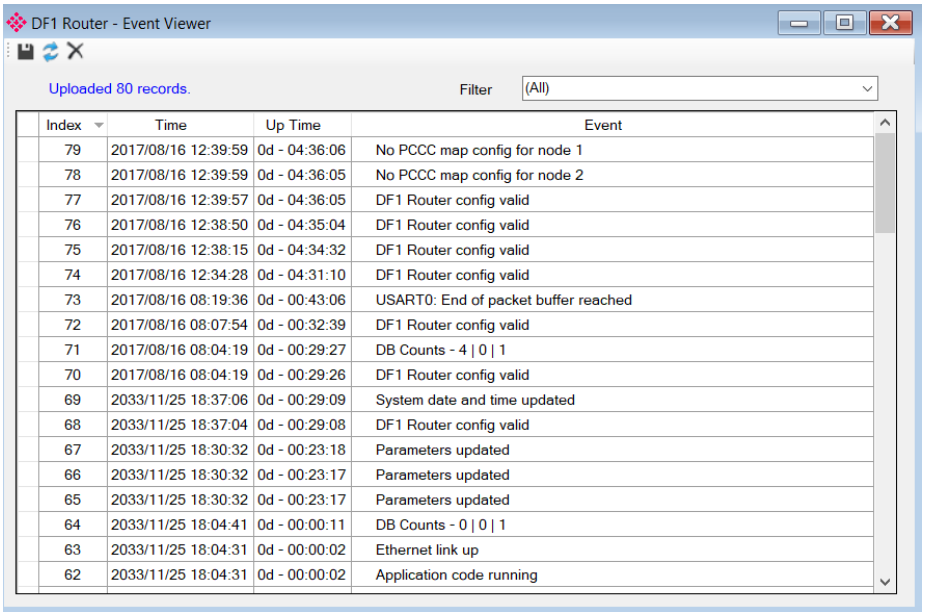


Figure 5.11 - Selecting the module Event Log

The Event Log window opens and automatically reads all the events from the module.
The log entries are sorted to have the latest record at the top. Custom sorting is achieved by double-clicking on the column headings.



Index	Time	Up Time	Event
79	2017/08/16 12:39:59	0d - 04:36:06	No PCCC map config for node 1
78	2017/08/16 12:39:59	0d - 04:36:05	No PCCC map config for node 2
77	2017/08/16 12:39:57	0d - 04:36:05	DF1 Router config valid
76	2017/08/16 12:38:50	0d - 04:35:04	DF1 Router config valid
75	2017/08/16 12:38:15	0d - 04:34:32	DF1 Router config valid
74	2017/08/16 12:34:28	0d - 04:31:10	DF1 Router config valid
73	2017/08/16 08:19:36	0d - 00:43:06	USART0: End of packet buffer reached
72	2017/08/16 08:07:54	0d - 00:32:39	DF1 Router config valid
71	2017/08/16 08:04:19	0d - 00:29:27	DB Counts - 4 | 0 | 1
70	2017/08/16 08:04:19	0d - 00:29:26	DF1 Router config valid
69	2033/11/25 18:37:06	0d - 00:29:09	System date and time updated
68	2033/11/25 18:37:04	0d - 00:29:08	DF1 Router config valid
67	2033/11/25 18:30:32	0d - 00:23:18	Parameters updated
66	2033/11/25 18:30:32	0d - 00:23:17	Parameters updated
65	2033/11/25 18:30:32	0d - 00:23:17	Parameters updated
64	2033/11/25 18:04:41	0d - 00:00:11	DB Counts - 0 | 0 | 1
63	2033/11/25 18:04:31	0d - 00:00:02	Ethernet link up
62	2033/11/25 18:04:31	0d - 00:00:02	Application code running

Figure 5.12 – Module Event Log

The log can also be stored to a file for future analysis, by selecting the Save button in the Tools menu.

To view previously saved files, use the Event Log Viewer option under the Tools menu.

5.5 Web Server

The PLX51-DF1-ENI provides a web server allowing a user without the PLX50 Configuration Utility or RSLogix 5000 to view various diagnostics of the module. This includes Ethernet parameters, system event log, advanced diagnostics, and application diagnostics (DF1 diagnostics).

NOTE: The web server is read-only and thus no parameters or configuration can be altered from the web interface.

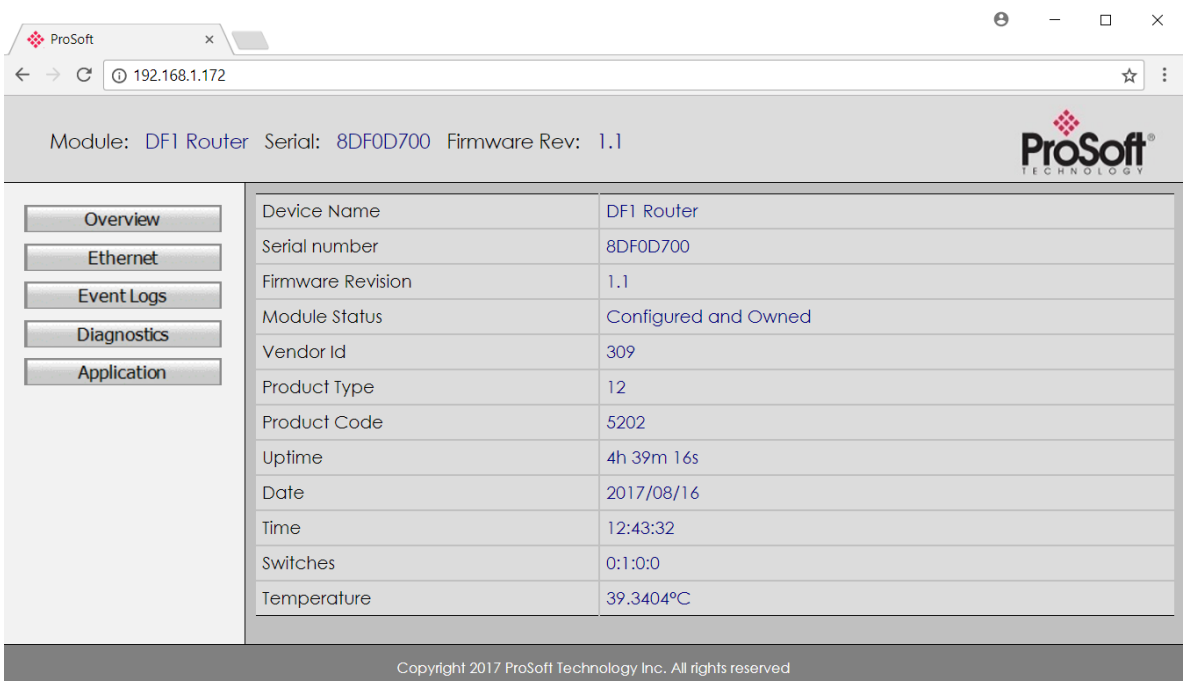


Figure 5.13 - Web interface

6 Technical Specifications

6.1 Dimensions

Below are the enclosure dimensions as well as the DIN rail dimensions. All dimensions are in millimeters.

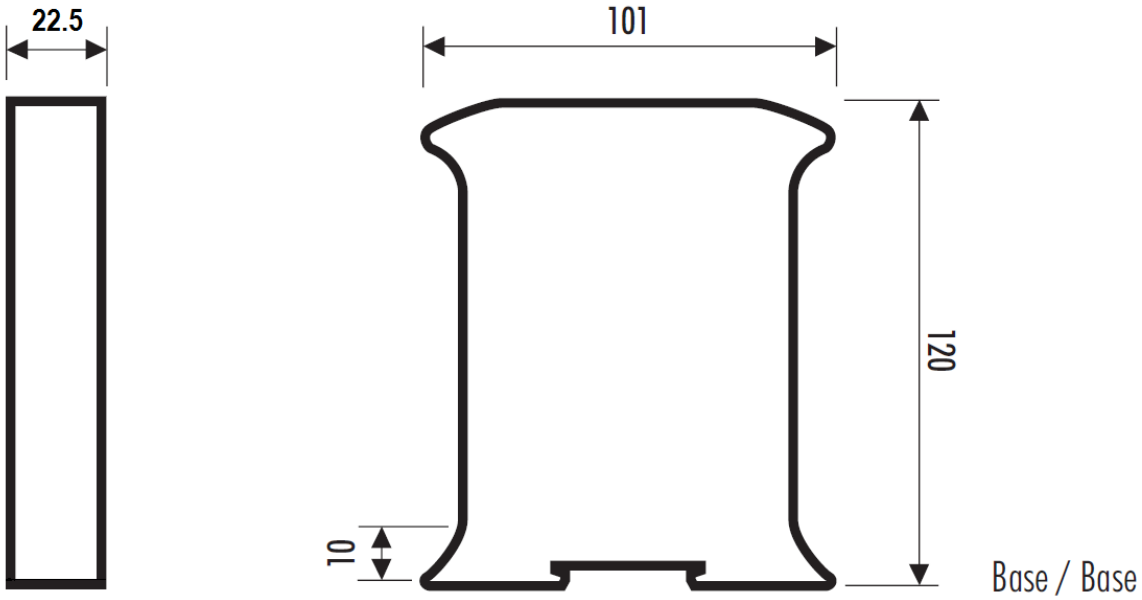


Figure 6.1 - PLX51-DF1-ENI enclosure dimensions

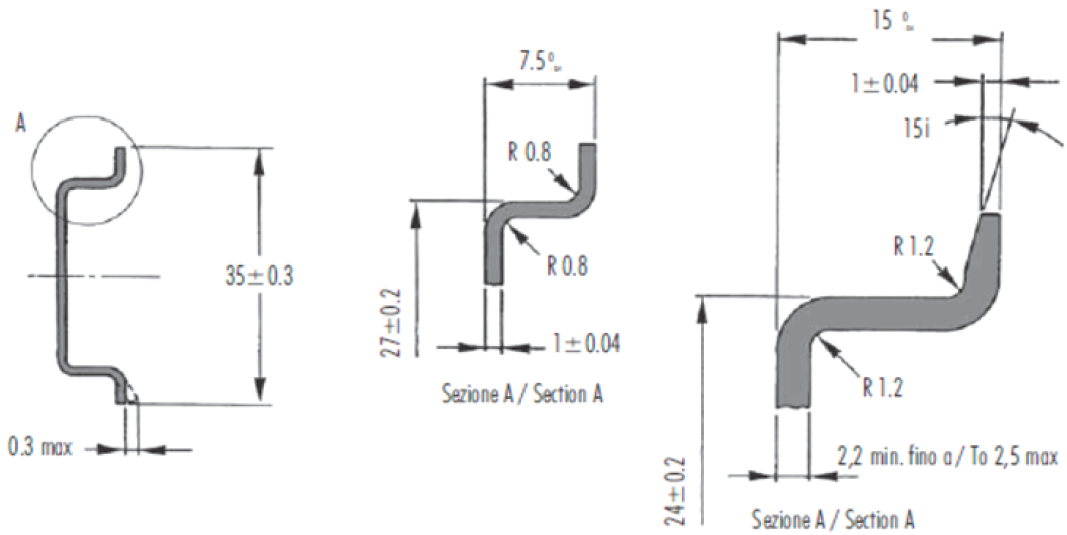


Figure 6.2 - DIN dimensions

6.2 Electrical

Specification	Rating
Power requirements	Input: 10 to 28V DC, (70 mA @ 24 VDC / 130 mA @ 10 VDC)
Power consumption	1.7 W
Connector	3-way terminal
Conductors	24 to 18 AWG
Enclosure rating	IP20, NEMA/UL Open Type
Temperature	-20°C to 70°C
Earth connection	Yes, terminal based
Emissions	IEC61000-6-4
ESD Immunity	EN 61000-4-2
Radiated RF Immunity	IEC 61000-4-3
EFT/B Immunity	EFT: IEC 61000-4-4
Surge Immunity	Surge: IEC 61000-4-5
Conducted RF Immunity	IEC 61000-4-6

Table 6.1 - Electrical specification

6.3 Ethernet

Specification	Rating
Connector	RJ45
Conductors	CAT5 STP/UTP
ARP connections	Max 20
TCP connections	Max 20
CIP connections	Max 10
Communication rate	10/100Mbps
Duplex mode	Full/Half
Auto-MDIX support	Yes

Table 6.2 - Ethernet specification

6.4 DF1 Protocol

Specification	Rating
Connector	4-way terminal
Conductor	24 to 18 AWG
Isolation voltage	2.5 kV
Protocol	DF1 Full Duplex, DF1 Half Duplex, DF1 Radio Modem
BAUD	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity	None, Even, Odd
Data bits	8
Stop bits	1
Error detection	CRC, BCC
Embedded response	Auto, On
Bridge mode	Max 20 routes; Max 8 controllers
DF1 Slave mode	Max 20 mapping items
Scheduled Tag mode	Max 20 mapping items
DF1 Slave Mode Message Support	PLC-5 Typed Read, PLC-5 Typed Write, SLC Typed Read, SLC Typed Write, PLC-2 Unprotected Read, PLC-2 Unprotected Write, PLC-2 Unprotected Bit Write
Scheduled Tag Mode Message Support	PLC-5 Typed Read, PLC-5 Typed Write, SLC Typed Read, SLC Typed Write

Table 6.3 - DF1 specification

6.5 Agency Approvals & Certifications

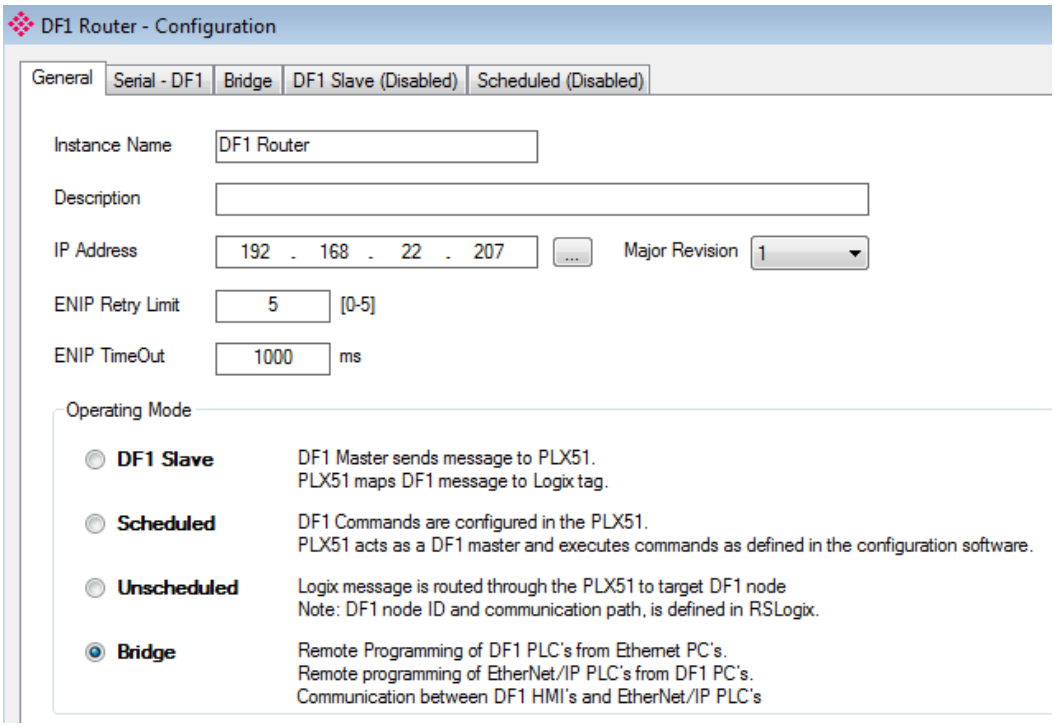
Please visit our website: www.prosoft-technology.com.

7 Appendix

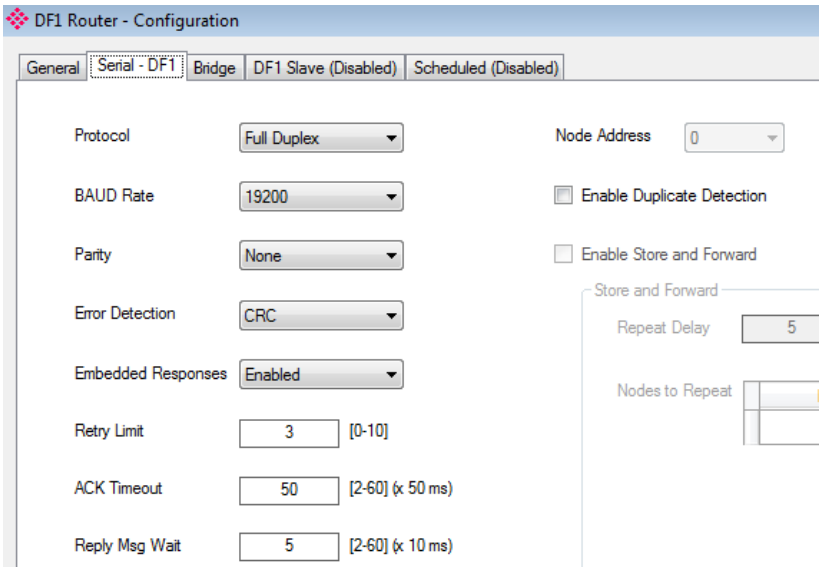
7.1 Example - Logix CPU to DF1 Bridge Mode

This example demonstrates how to issue a message instruction from an EtherNet/IP–based ControlLogix or CompactLogix CPU, to a DF1 device.

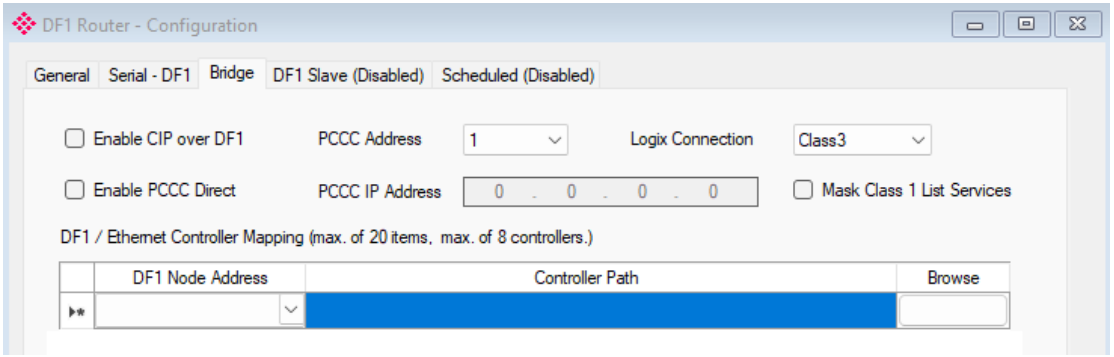
1 Set the PLX51-DF1-ENI to operate in *Bridge* mode.



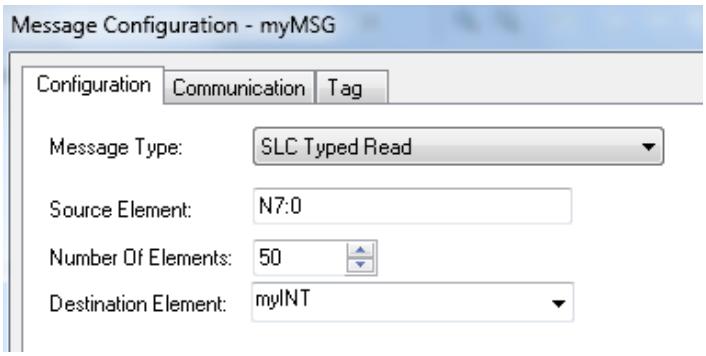
2 In the *Serial - DF1* tab, ensure the settings match that of your DF1 device (this example is using a MicroLogix 1100). Also, uncheck the **ENABLE DUPLICATE DETECTION** box. Do this in your DF1 device, as well.



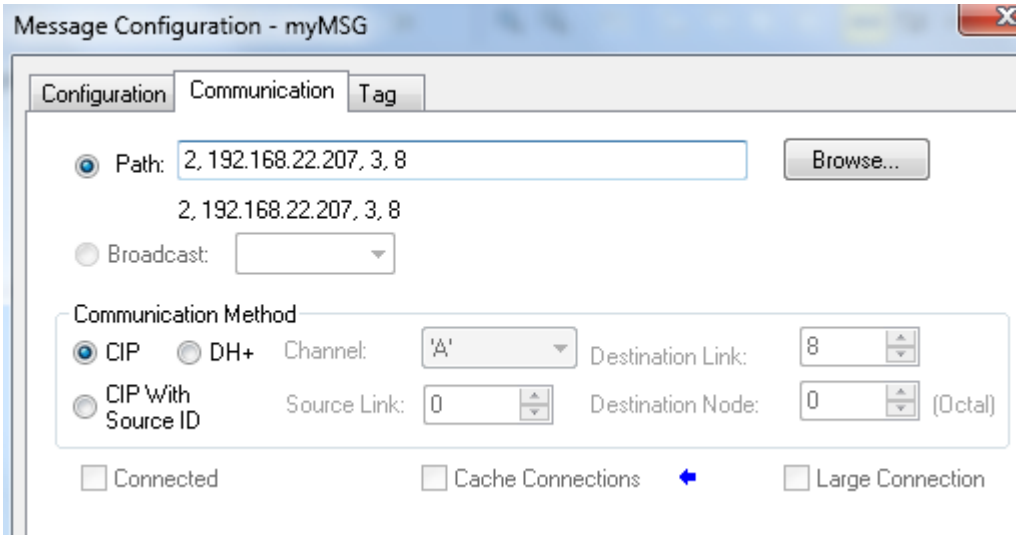
3 You will not need to edit the default settings in the *Bridge* tab. The PLX51 configuration is complete.



4 In the Logix MSG instruction *Configuration* tab, define the *Message Type* and its parameters. See the example below:



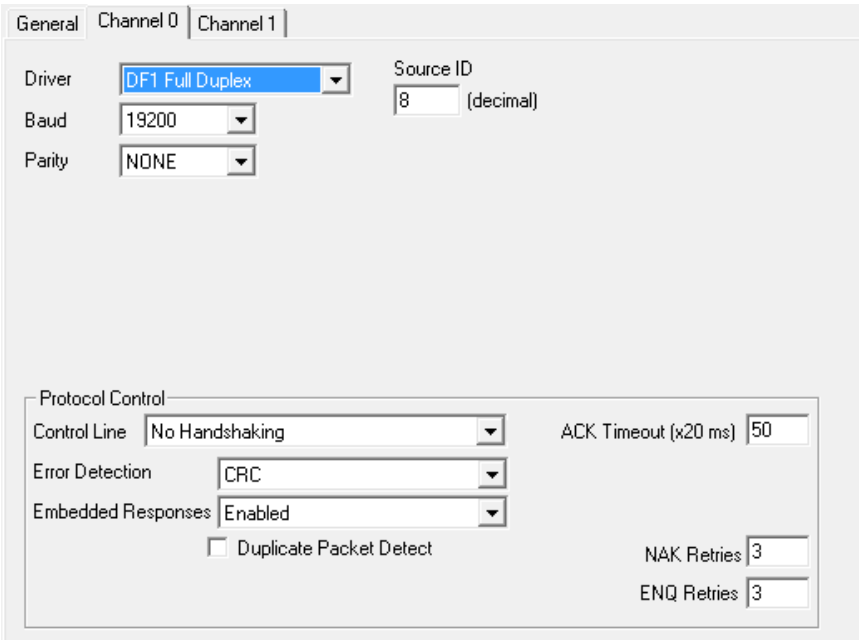
5 In the Logix MSG instruction *Communication* tab, specify the following *Path*: 2**, <IP>**, 3, **<DF1nodeID>**



Where:

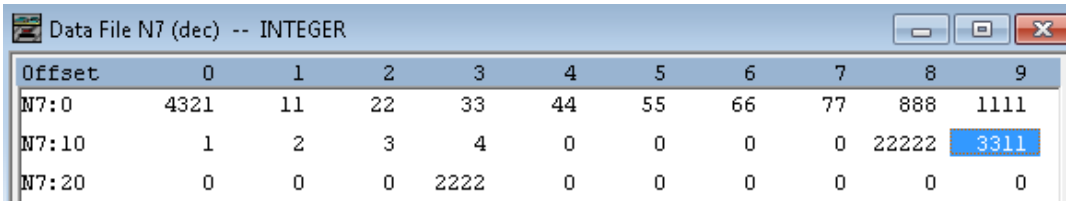
Path Parameter	Description
2	EtherNet/IP
192.168.22.207	PLX51-DF1-ENI IP address
3	PLX51-DF1-ENI DF1 port
8	DF1 Node ID of MicroLogix 1100

6 In this example, the MicroLogix 1100 DF1 Ch0 port configuration is shown below:

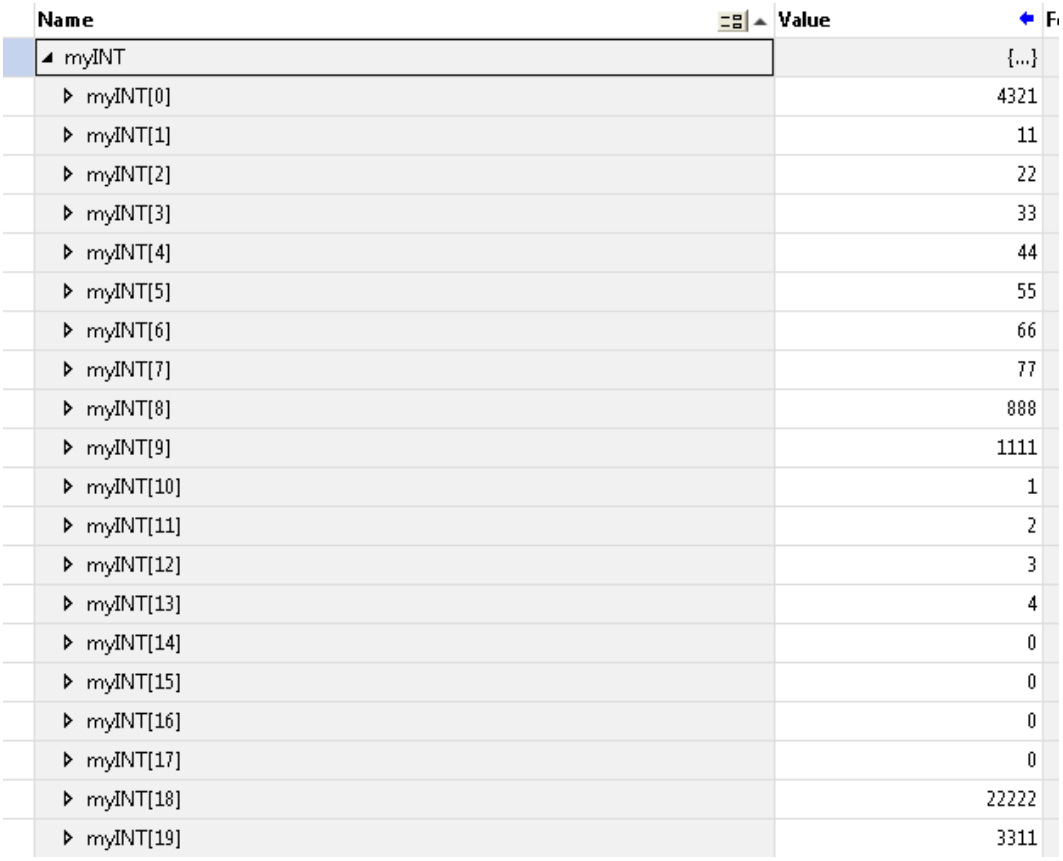


7 Below are example values after a successful MSG.

In the MicroLogix 1100:



In the L36ERM:



8 Support, Service & Warranty

8.1 Contacting Technical Support

ProSoft Technology, Inc. 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 interfaced serial, Ethernet or Fieldbus devices

North America (Corporate Location)	**Europe / Middle East / Africa Regional Office**
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Latin America Regional Office	**Asia Pacific Regional Office**
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For additional ProSoft Technology contacts in your area, please see:
www.prosoft-technology.com/About-Us/Contact-Us

8.2 Warranty Information

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www.prosoft-technology.com/Services-Support/Return-Material-Instructions