Technical Note

DF1 to EtherNet/IP with PLX51-DF1-MSG

Migrating DF1 communication to EtherNet/IP with PLX51-DF1-MSG

Document Code: TN-001-PLX51DF1MSG-20

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Contents

Description

Typical case for this project consists in migrating DF1 communication between ControlLogix and third party device, third party device being replaced by a ControlLogix on EtherNet/IP network.

DF1 protocol has to remain as it goes via a wireless link that is not to be changed immediately.

A PLX51-DF1-MSG module (DF1 Messaging module) has been used to create the DF1-EtherNet/IP link.

This technical note shows how to reproduce similar project in your specific conditions.

Testing Setup

The following hardware and software have been used for creating this technical note, other similar items can be used instead given that it support the same functionalities.

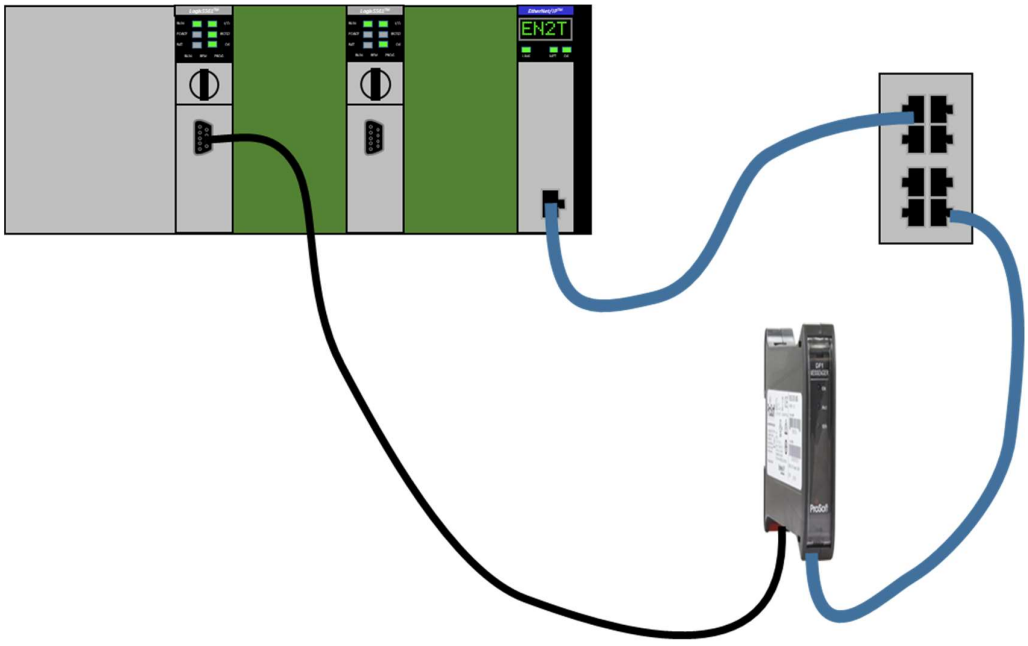
Hardware Requirements

Part Number	Short Description	Application
PLX51-DF1-MSG	DF1 Messaging Module	Object of technical note
1756-L61	ControlLogix CPU with DF1 communication	PLC used as DF1 master
1756-L61	ControlLogix CPU with EtherNet/IP adapter	PLC used as EtherNet/IP server
1756-EN2T	EtherNet/IP adapter for ControlLogix	Create Ethernet link
1756-A7	Chassis for ControlLogix	Holds PLCs
1756-PA72	Power supply for ControlLogix	Supplies power to PLC cards
Ethernet cables	Cat 5 cable or better	Interconnects EtherNet/IP devices
Serial cable	Standard null modem cable can be used	Interconnects DF1 devices

Software Requirements

Software	Version	Application
PSW-PCU	1.012	PLX50 Configuration Utility
RS/Studio Logix 5000	8 to 32 (used 20.05 last for 1756-L61 CPU)	ControlLogix programming tool

Architecture



Implementation

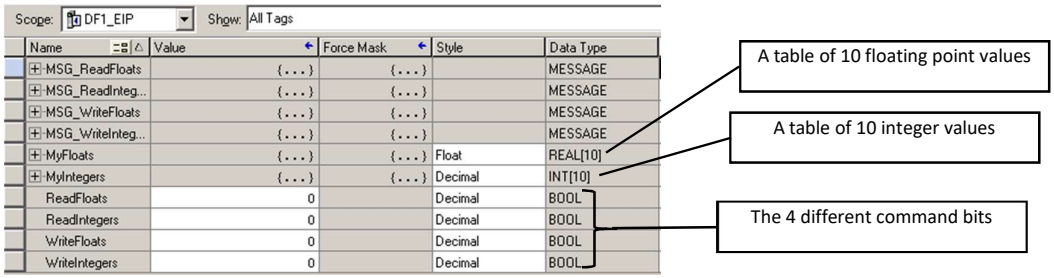
1756-L61 – DF1 to PLX51

This CPU is located in the slot 0 of the chassis as per architecture in previous page, this CPU will hold the DF1 communication via its embedded serial port.

Controller Tags

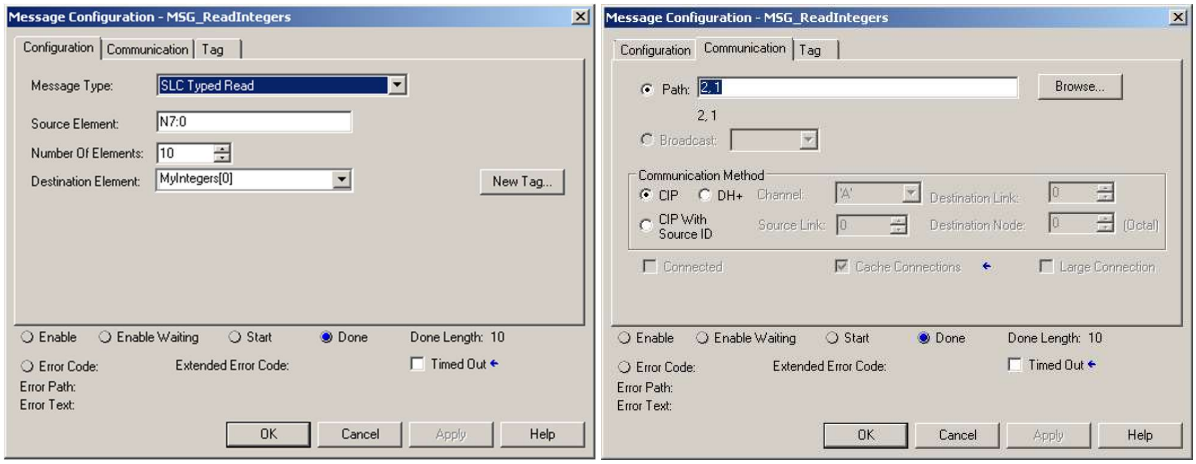
Controller Tags in this PLC will hold data of course, plus it will allow generating messages.

Booleans are used to send message a single time, toggle to read or write, again and again.



Message Instructions

Message instructions (MSG) will be used, with parameters as follow for reading Integers for example:



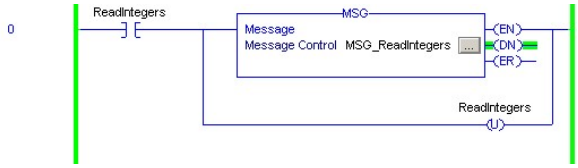
Parameters will be changing depending on data type to read or write and action, read or write.

In the “Communication tab, the Path “2, 1” means serial port, DF1 slave ID 1.

Examples for writing integers and reading and writing floats can be found in annex p. 13.

Ladder logic

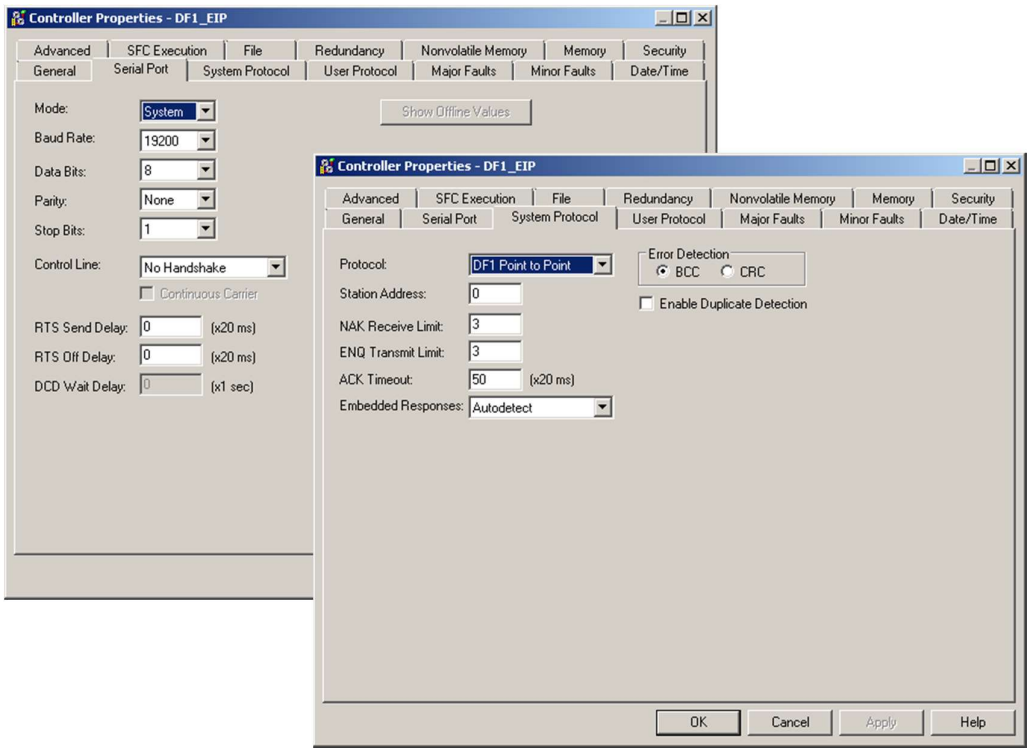
A very simple ladder logic is required to send MSG instructions from one end to the other.



A similar code can be used for all other message instructions.

Serial port configuration

Serial port communication requires settings on the CPU, here is what I used:



Those settings will have to match with the PLX51-DF1-MSG serial port settings, p. 9 in this technical note.

Downloading application

Download to the CPU.

1756-L61 – EIP to PLX51

This CPU is located in the slot 3 of the chassis as per architecture in previous page, this CPU will hold the EtherNet/IP communication via the EtherNet/IP adapter at slot 6.

Please note that you can also test with the same CPU if you don't have two; it was clearer for the technical note to have two CPUs.

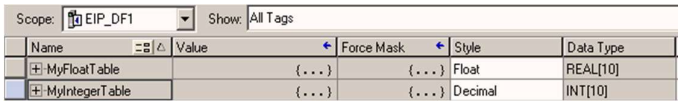
Controller Tags

Controller Tags in this PLC will only hold data.

The tag names can reflect the file number in the remote PLC but it is not mandatory.

You can create several tables which data will be sourced in the local or remote PLC.

Below is what I used:



Ladder logic

No ladder logic is require on that CPU to handle communication, it acts as a "data server".

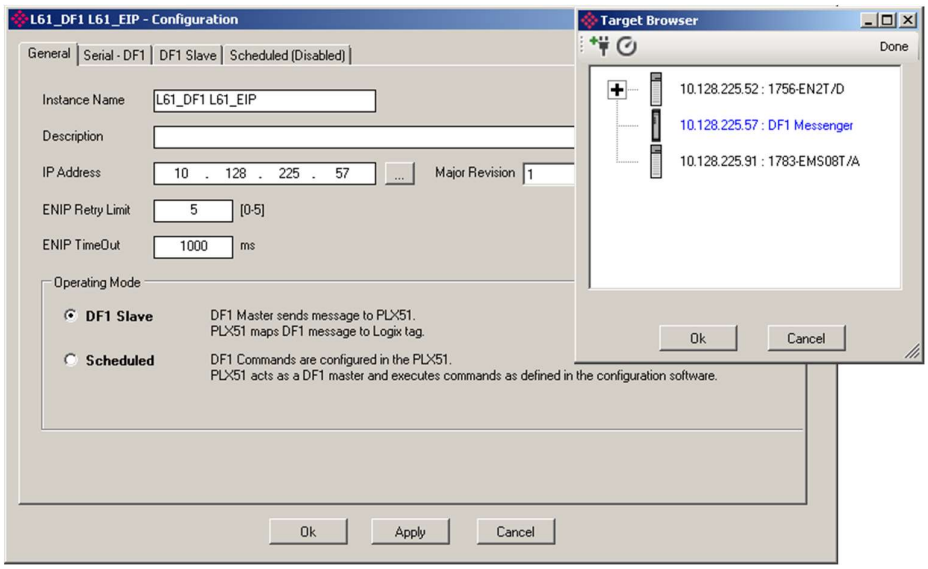
Downloading application

Download to the CPU.

PLX51-DF1-MSG – DF1 to EIP

Configuration of the PLX51-DF1-MSG is quite simple, see below.

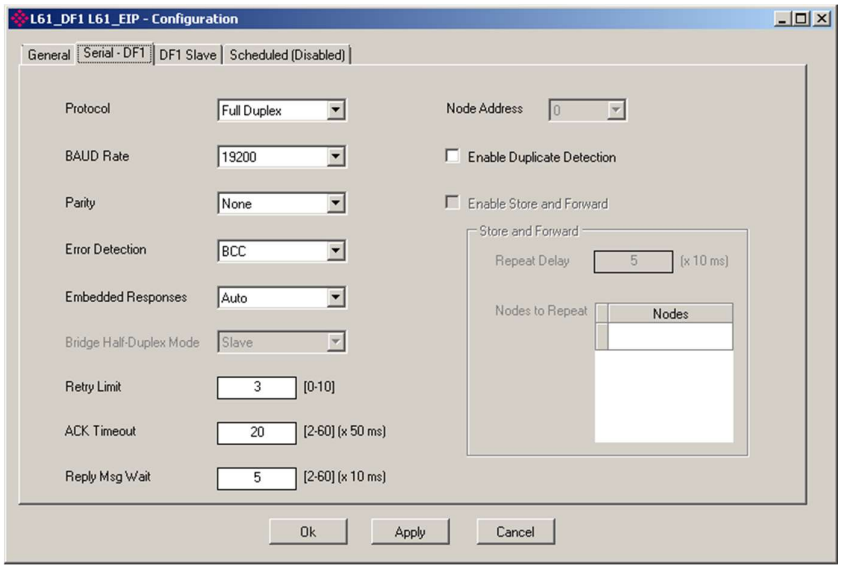
"General" tab



Type an IP address or select with the "…" button (see "Target Browser" window above).

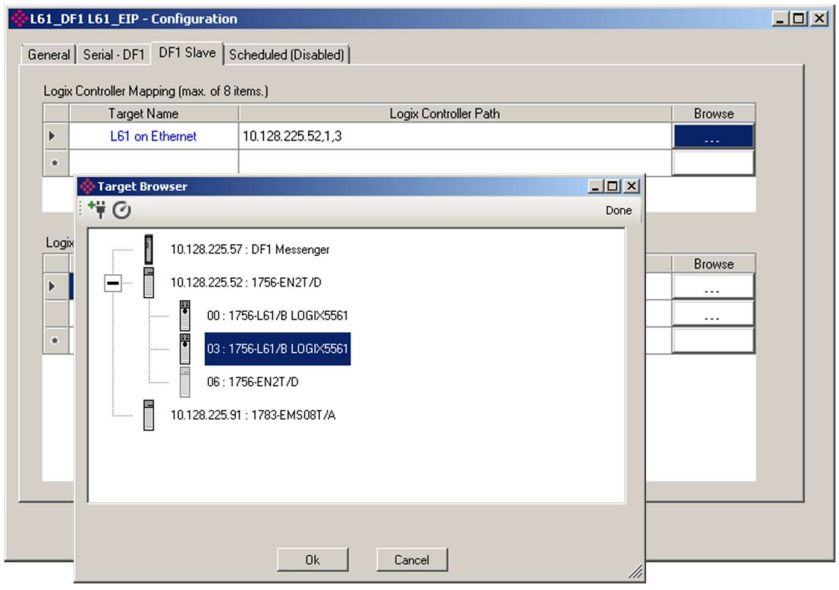
Select "DF1 slave" (default).

"Serial - DF1" tab



Must match PLC's "System" port setting (see p. 7 in this technical note).

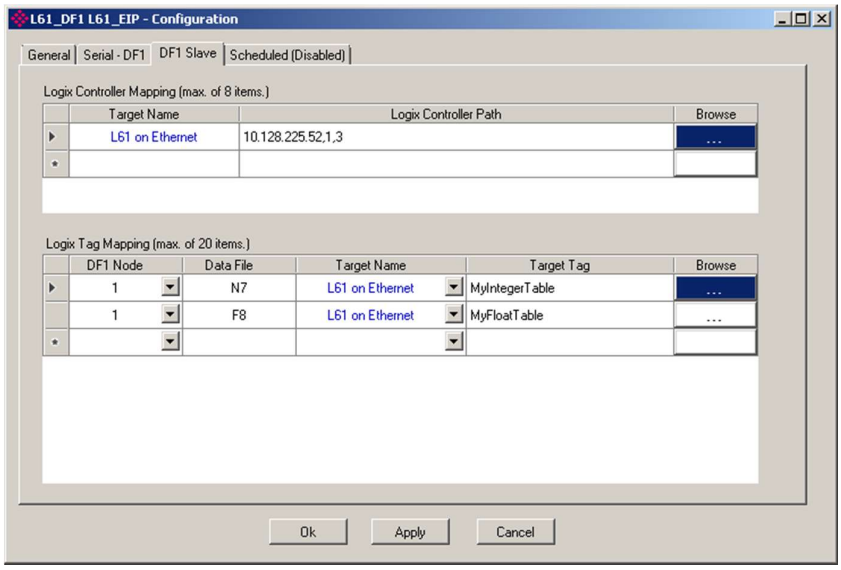
"DF1 Slave tab"



First you need to give your Logix controller a name, as you can see it can be "complex" name.

Then, create a link to the EtherNet/IP PLC, here my CPU is at slot 3, the Logix Controller Path will be created accordingly.

Once target is created, you can setup data maps as below:



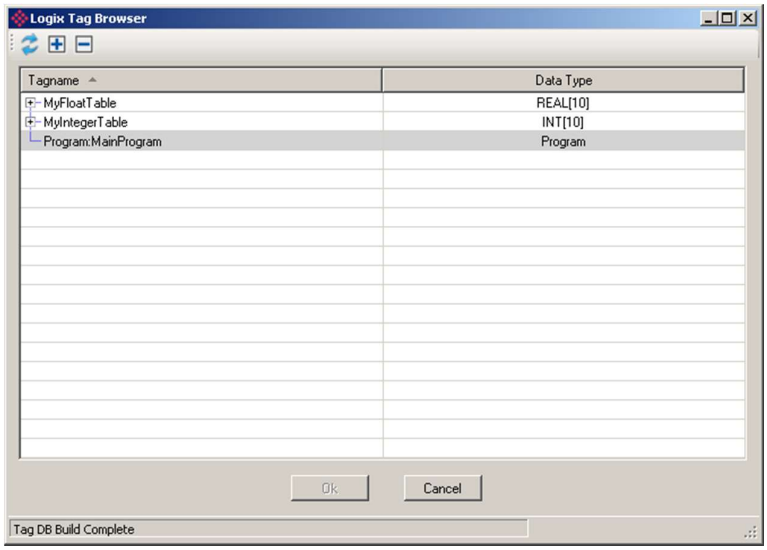
Select the virtual DF1 node ID that the module will emulate to communicate with the DF1 PLC; the node I can be used several times.

Create a new data file (can be “N” for integer or “F” for floating point), I used N7 and F8 in this example.

Link the node to the target you just created.

Type or select the tag (table of integers or reals) in the PLC.

When clicking on the “…” button, the following window appears, letting you selecting the tag you want to use:

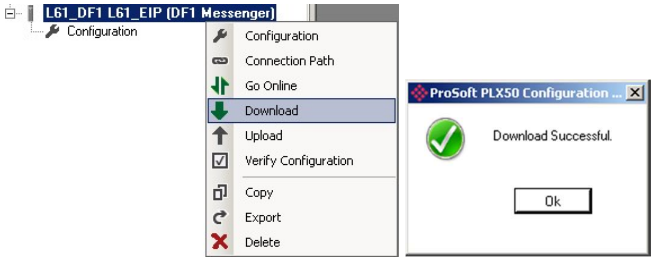


Note that you need to select the table here, not an element of the table, the selection of elements is done in the MSG instruction.

Downloading configuration

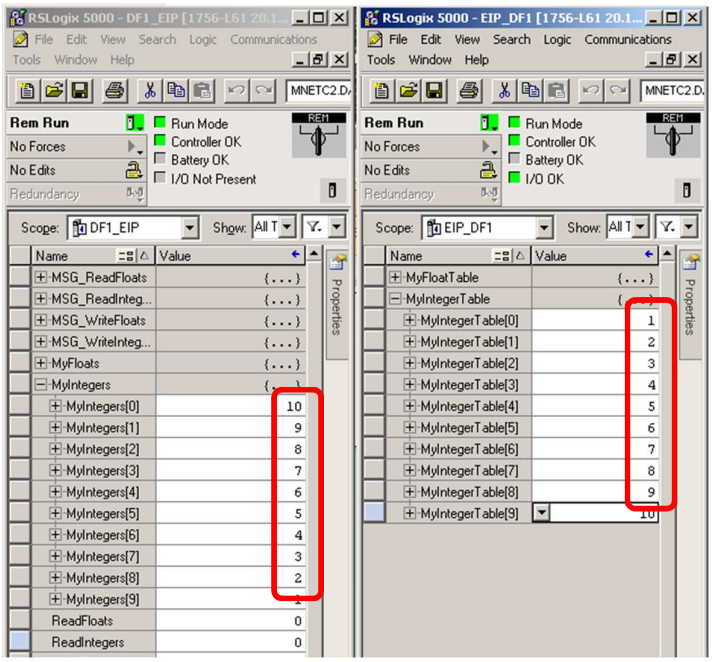
Once completed, you can simply download your project to the PLX51-DF1-MSG as below.

Right-click on module and select “Download”, when finished click “Ok”:



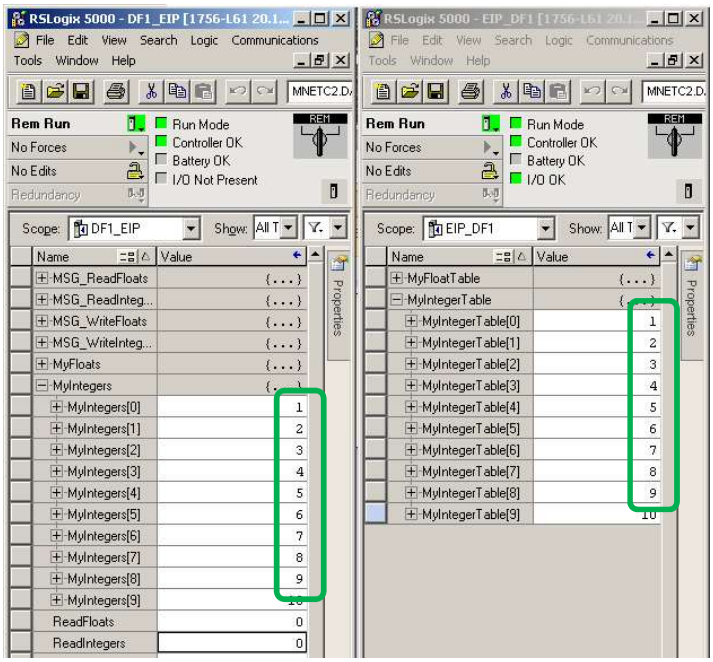
Testing

Go online with both CPUs and monitor tags:



We can see here that the data don't match on both sides (it is in reverse order).

Now set 1 in the "ReadIntegers" bit on the DF1 CPU, you should observe same data in the two tables.

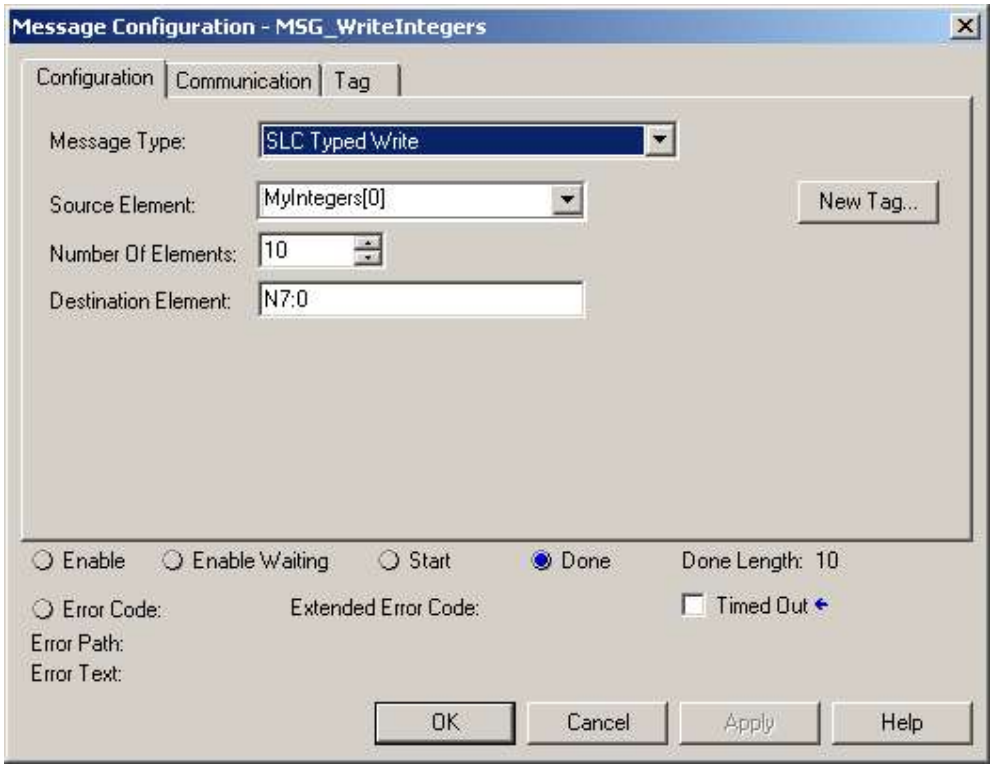


Similar test can be done to read or write integers or floats.

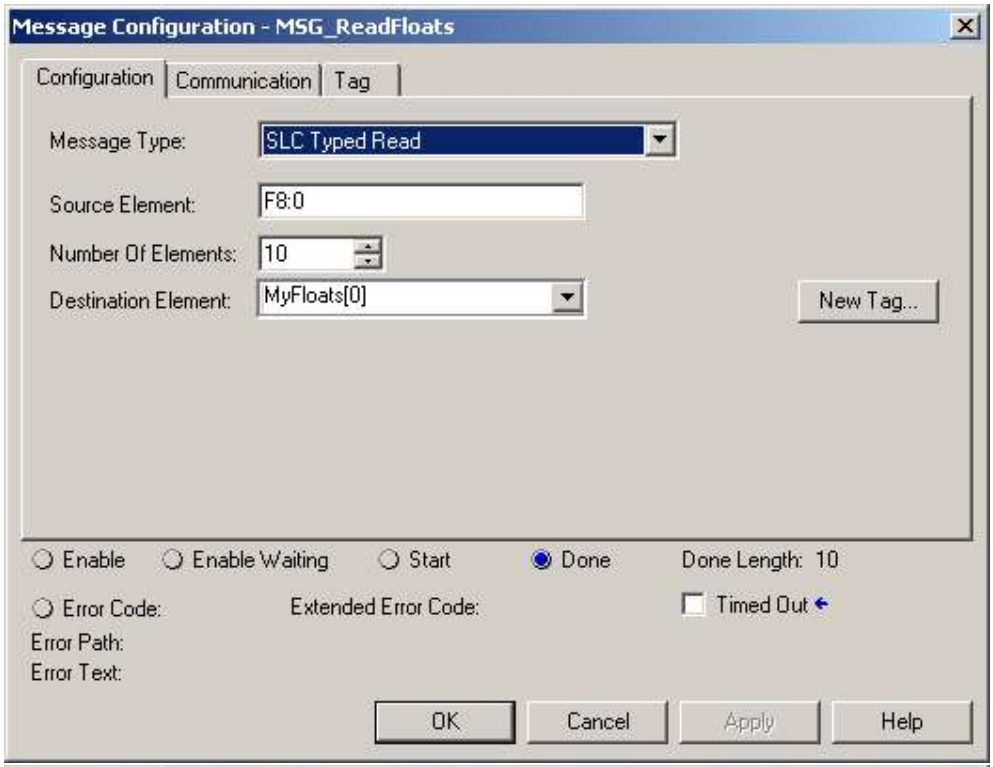
Annexes

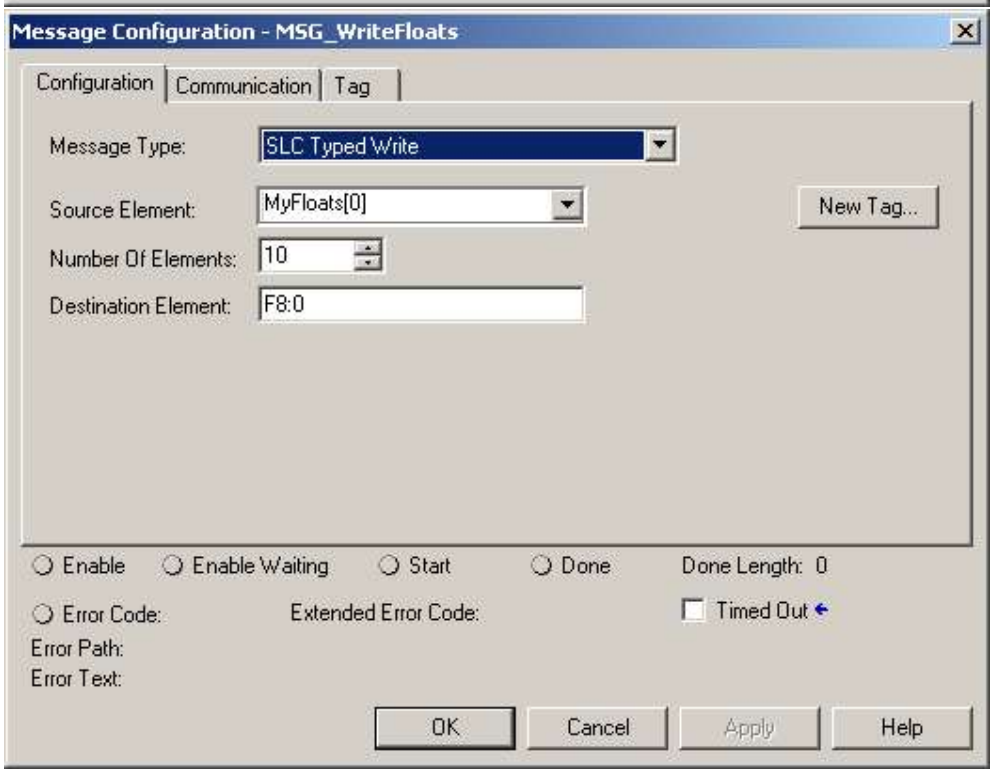
Messages configuration

Read and write Integers

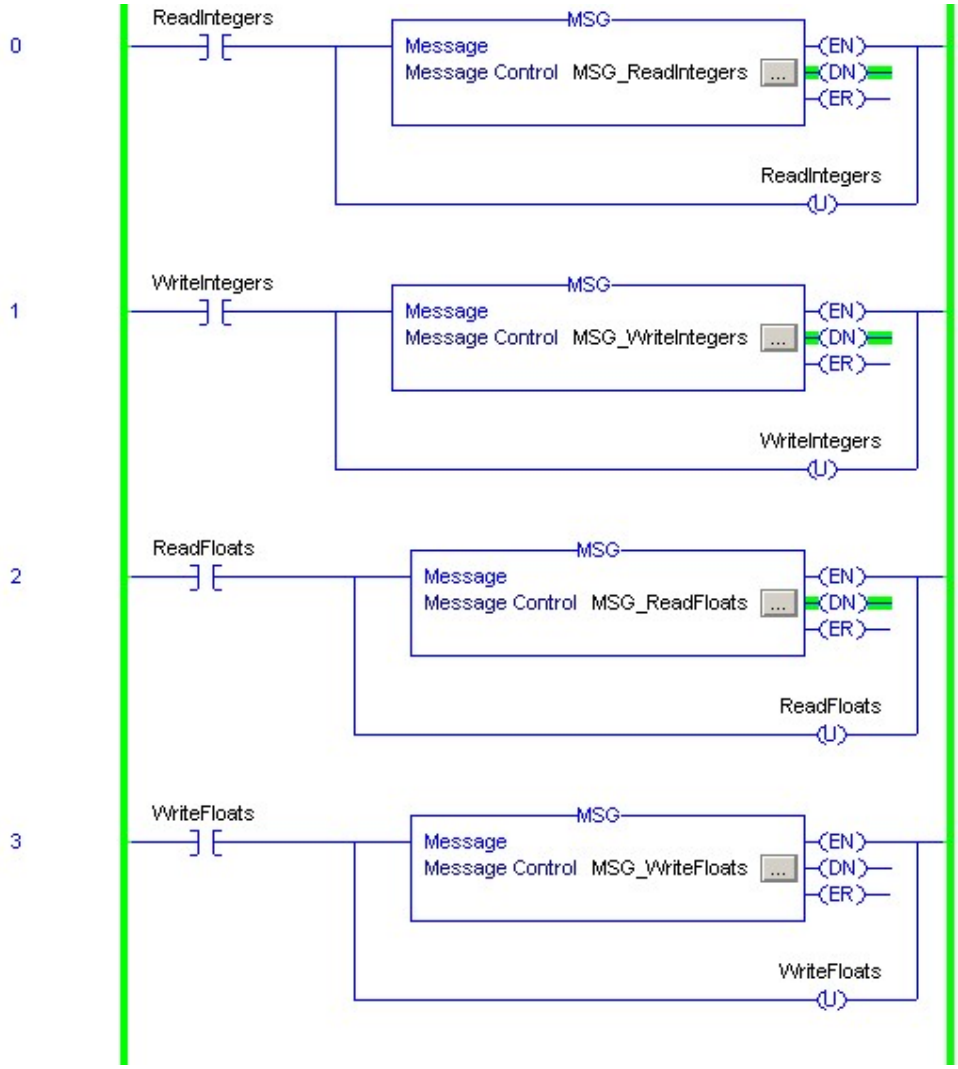


Read and write Floats





Ladder logic



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