Configuring EtherMeter®–MicroLogix Communications Using the 1761-NET-ENI Module.

(Note: This document also applies to EtherMeter-SLC/5xx Communications.)

The purpose of this document is to provide assistance to the Allen Bradley PLC user who wishes to connect to an EtherMeter using the 1761-NET-ENI module and the EtherNet/IP™ protocol. This document assumes that the user is well-versed in Rockwell Automation PLC's, the RsLogix Programming Environment, the EtherNet/IP protocol, and the 1761-NET-ENI module.

When creating an EtherNet/IP™ client/server connection between an Allen Bradley MicroLogix (client) and an EtherMeter™ (server), no special setup is generally required within the EtherMeter's Setup Menu. The EtherMeter features an "always-on" EtherNet/IP™ server on TCP logical port 44818; and it is configured to auto-detect and service incoming client requests from MicroLogix 1100/1400 PLC's, CompactLogix PLC's, and 1761-NET-ENI modules. To simplify integration into an EtherNet/IP network, the EtherMeter emulates a SLC/500 series PLC.

1. Wiring Configuration.

   In this example, the Ethernet ports of the 1761-NET-ENI and EtherMeter are wired directly to each other, without an Ethernet switch, using a single Ethernet crossover cable. Alternatively, the Ethernet ports of both the 1761-NET-ENI and EtherMeter could be connected to a common Ethernet switch if expanded network connectivity is desired. Additionally, Port 2 (Serial) of the MicroLogix 1400 is connected to the 1761-NET-ENI module using a 1761-CBL-PM02 serial cable. For reference, the wiring and hardware configuration is illustrated in Figure 1.
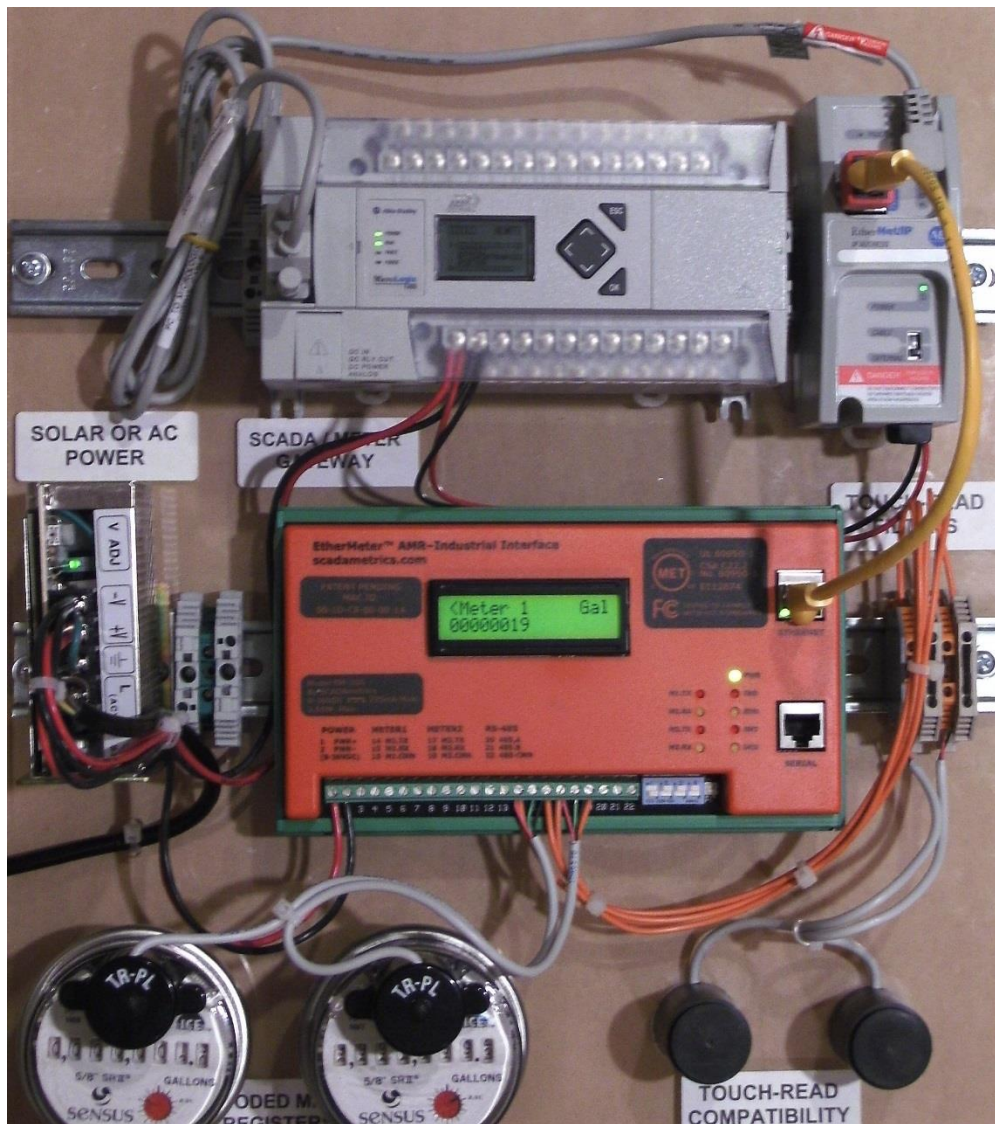
Figure 1. EtherNet/IP™ Communication Demonstration Panel.
MicroLogix 1400 / EtherMeter Hardware and Wiring Configuration.

* EtherNet/IP™ is a trademark of ControlNet International.

2.   1761-NET-ENI Configuration.

First, the ENI/ENIW Utility should be downloaded from the ab.com and executed:

http://www.ab.com/programmablecontrol/plc/micrologix1000/networkinterfaces.html

First, at the "Utility Settings" tab, the baud rate and COM port of the PC should be selected. In this example, the COM port was selected as COM7, although this setting is specific to the target computer. The baud rate was selected as 38400 (the ENI default). See Figure 2.
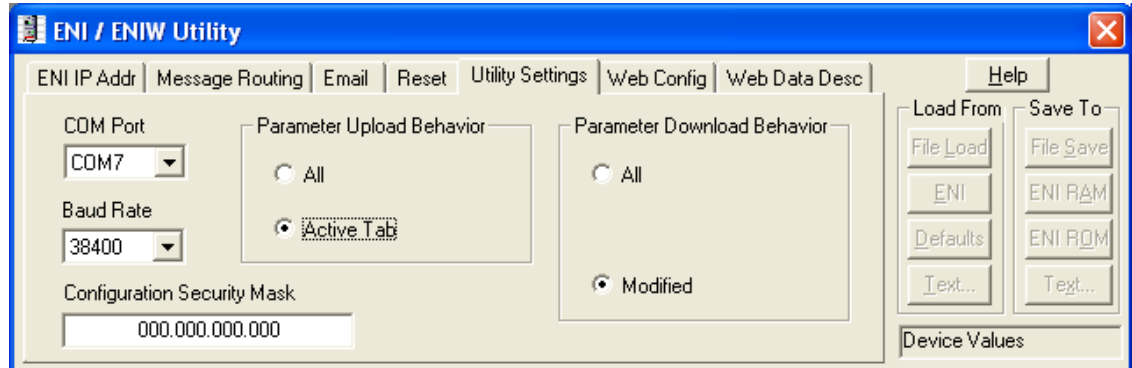

Figure 2. ENI/ENIW Utility: "Utility Settings"

Next, the current ENI settings should be loaded into the ENI Utility by pressing the "Load From… ENI" button.

Once the settings are displayed within the utility, the ENI's 232 baud rate should be set. In this example, 19200 was entered (and also used consistently as the PLC's 232 baud rate). Additionally, the IP address information should be entered. The IP address settings are network-specific and may differ from the settings shown. See Figure 3.
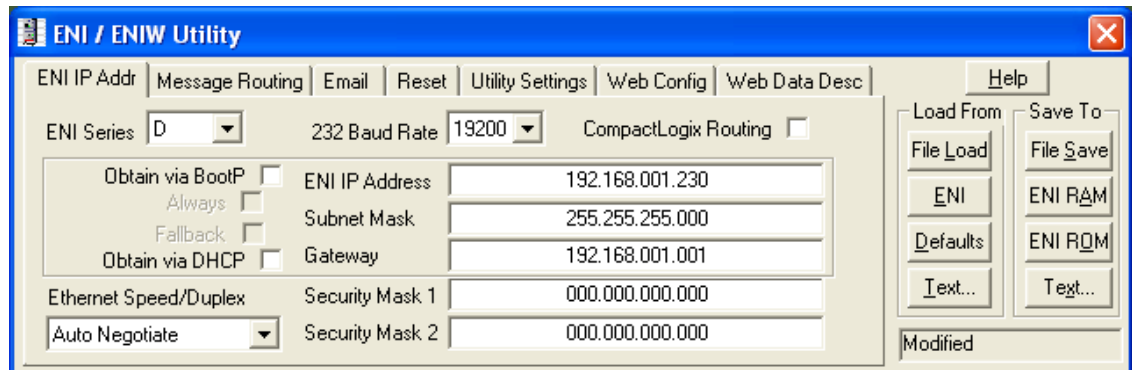

Figure 3. ENI/ENIW Utility: "ENI IP Address Settings"

Next, the message routing information should be entered. The virtual DF1 station address of the EtherMeter is selected to be "4", and the actual IP address of the EtherMeter is entered as 192.168.001.140. The result of these settings is that all PLC DF1 requests to station 4 will be converted by the NET-ENI to EtherNet/IP and re-routed to the EtherMeter at 192.168.001.140. See Figure 4.
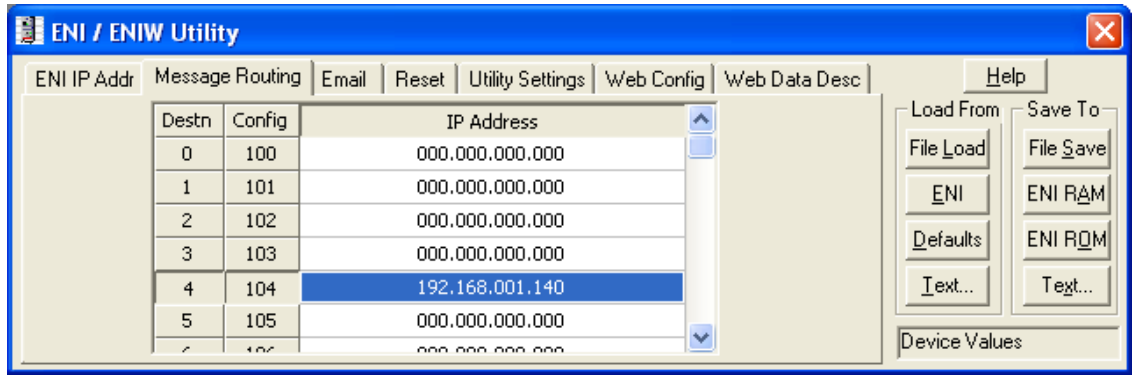
Figure 4. ENI/ENIW Utility: "Message Routing Settings"

3. MicroLogix Serial Port (Port 2) Configuration.

Within a MicroLogix (or other Allen Bradley) PLC, communication setup is performed within the RsLogix Programming Environment. Figure 5 displays a screen snapshot of a simple ladder logic program that is designed to poll the two (2) totalization and two (2) flow-rate registers of an EtherMeter, deposit the data into the N7:xx integer (16-bit) registers, and then copy the data into the L12:xx long integer (32-bit) registers:
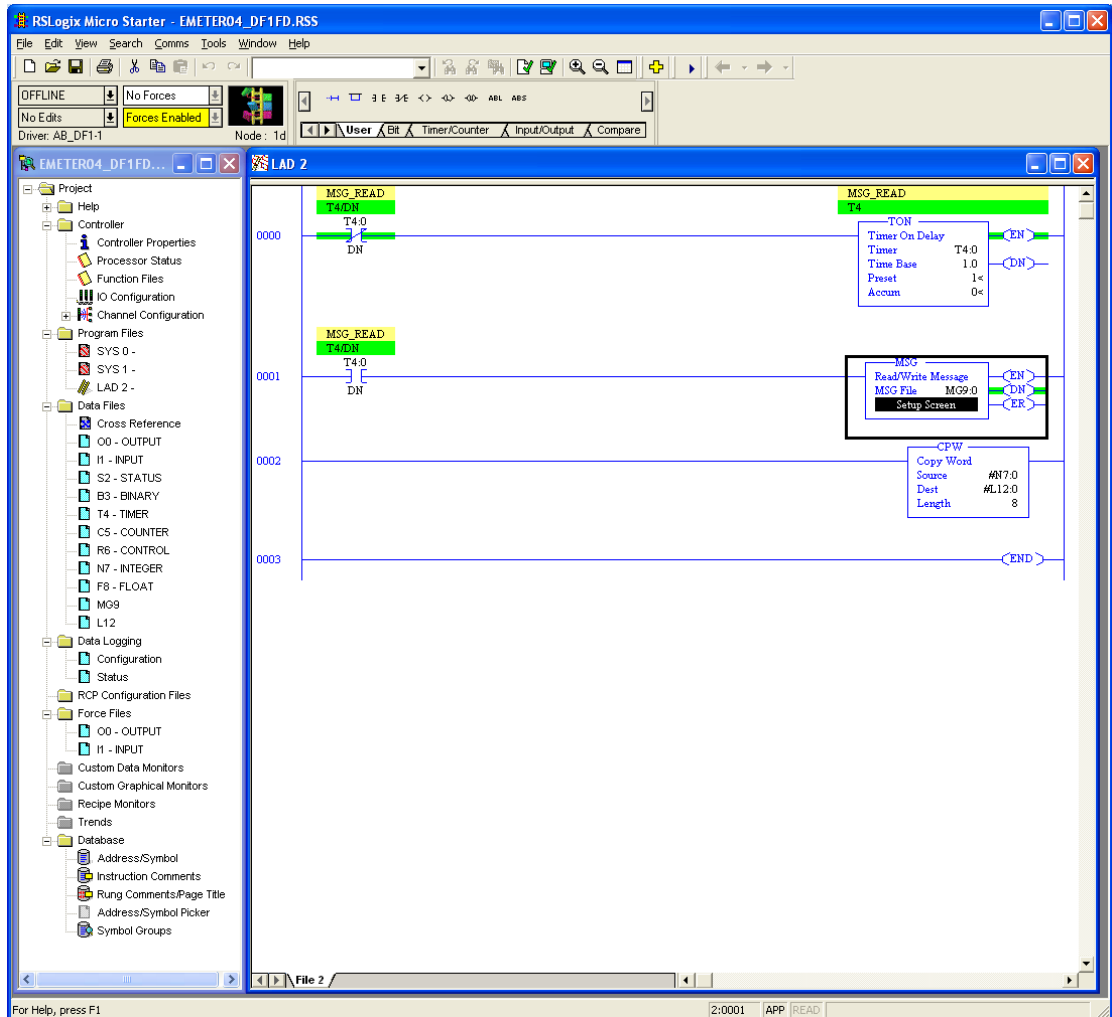

Figure 5. RsLogix Programming Environment.

To begin the setup, a new programming project should be initialized In RsLogix using the appropriate selections for processor type, version, serial port setup, etc.. For brevity, the details of these steps have been omitted.

In order to configure the MicroLogix's Ethernet port, double-left-click the "Channel Configuration" icon in the Project (leftmost) Frame. The "Channel Configuration" window will appear. Select the "Channel 2" tab, and enter the setup parameters as shown in Figure 6.
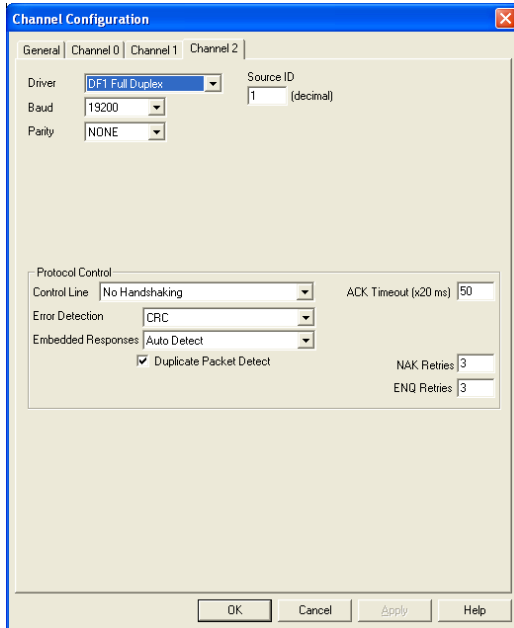

Figure 6. Channel 2 (Serial Port) Configuration Window.

4. Ladder Logic.

In Rung 0, a self-resetting, one-second timer is created to set up the polling interval, although a shorter or longer polling interval could be selected, depending upon the application.

In Rung 1, the one-second timer is used to trigger the message instruction to the EtherMeter. A double-left-click on the "Setup Screen" button of the MSG Block causes a popup window to appear, as shown in Figure 7. The setup parameters should be entered as shown in the figure.

Within the popup window, first the "General" tab should be selected, and the parameters on its page should be entered as instructed below. The General tab is shown in Figure 7.
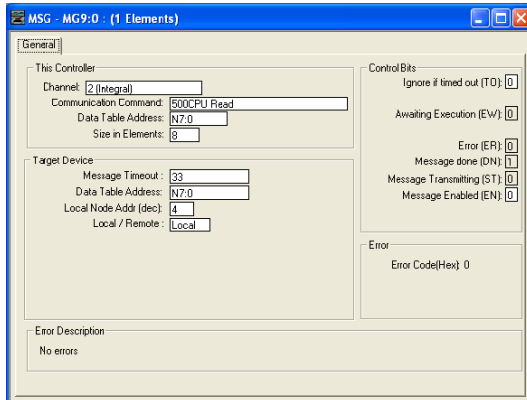

Figure 7. Message Configuration Window (General Tab).

Under the "This Controller" heading, note that the selected Channel is "Channel 2 (Integral)", which corresponds to the DB-9M serial port of the MicroLogix 1400. The selected "Communication Command" is "500CPU Read", as the EtherMeter emulates a SLC/500. The selected target data table address within the MicroLogix is N7:0, although a different memory location could be chosen. The "Size in Elements" is entered as "8" (8 x 16-bit words), because in this example four 32-bit words are requested from the EtherMeter (Total1, Total2, Flow1, Flow2).

Under the "Target Device" heading, note that the "Data Table Address" is entered as N7:0, as this is the desired beginning memory location within the EtherMeter. For the complete memory map of the EtherMeter, please refer to the User Manual or Setup Menu. For "Local/Remote", "Local" should be selected.

In Rung 2, the eight 16-bit words contained in the N7 registers are copied into the L12 registers, which are used for holding long (32-bit) integers.

5. Results.

After the Ethernet port is configured and the ladder logic is written, the program should be downloaded into the MicroLogix; and the PLC should be placed into "Run Mode".

In this example, the EtherMeter is reading two encoded meter registers. As documented in the EtherMeter User Manual, the totalization register contents are never scaled by the EXPn multiplier, so as to eliminate the possibility of 32-bit overflow conditions. The following meter data is applicable to this example:

Meter 1 Total:	1.9 GAL	(Register Contents: 19)
Meter 2 Total:	9999999.2 GAL	(Register Contents: 99999992)
Meter 1 Flow Rate:	0 GPM	(Register Contents: 0)
Meter 2 Flow Rate:	0 GPM	(Register Contents: 0)

Figure 8 displays screen snapshots of the N7 and L12 register contents. Note that the large value for Meter 2 (99999992) spans two 16-bit registers (N7:2-3), so this value is only rendered correctly in the context of a single, 32-bit register in L12:1.
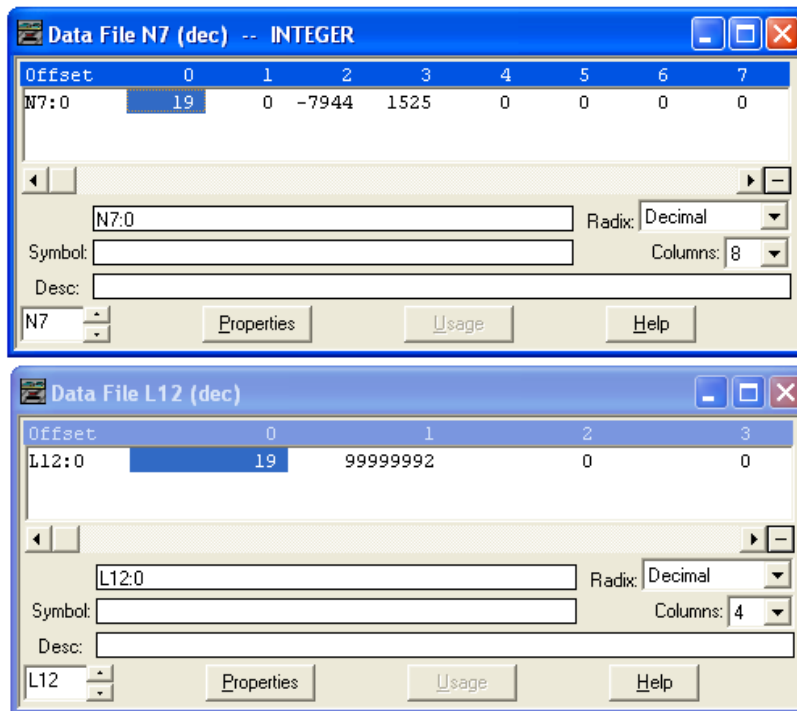

Figure 8. Register Display Windows (Realtime).