PURPOSE

The purpose of this document is to provide the reader with instruction for communicating Profibus DP using the 450U-E Ethernet Modems over RS485 serial connections.

This application should be read in conjunction with the user manuals for details on powering and programming the Ethernet Modems. The reader should also have a firm understanding of programming and configuration of Profibus devices.

This application note was written using a Point to Point application however a similar configuration could be used for a Point to Multi-Point application.

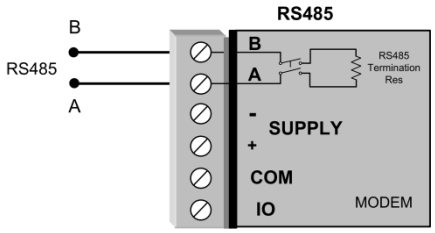
MATERIALS

The materials used for this application were,
Siemens S7 300 PLC, CPU 314C-2DP, Siemens ET200S Remote I/O & Step 7 Programming Software for programming PLC,
450U-E Ethernet Modem's,
Windows PC with web browser, recommended Internet Explorer 7 or greater.
Straight through Ethernet cable for programming, Profibus - Modem terminal cables.
Suitable Power Supplies for powering modems and Profibus Equipment

Profibus Communications Cable

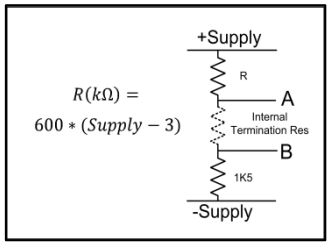
Profibus communications is transported via RS485. However Profibus devices all use DB9 connectors for interfacing. The Profibus RS485 connection should be made only to pins 3 and 8 of the Profibus D9 connector. The pinouts for this connector are:

Pin	Description	455U
1	Not connected	
2	Not connected	
3	**+ve RS485 (Positive)**	**A**
4	RTS (request to send)	
5	GND - Isolated GND from RS485 side	
6	+5V - Isolated 5V from RS485 side	
7	Not connected	
8	**-ve RS485 (Negative)**	**B**
9	Not connected	



Profibus RS485 connection

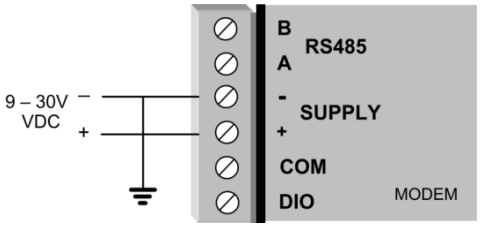
RS485 Termination resistor must be switched on for both modems.
If the modem hardware board revision is pre V1.2 (version can be found on web page), pull up resistors maybe required if the connected devices do not support the biasing.
A fixed 1K5 biasing resistor is required between the B terminal and the – Supply (GND) and another between the A terminal and the +Supply which can be calculated using the formulae shown.



Check the Termination voltages when connected.
With the RS485 Termination Resistor switched on the voltage between A & GND (2.8V) should be slightly higher that the voltage between B & GND (2.5). The difference should be approx. 0.2 to 0.4V.

Power Connections

The 450U-E Modems can be powered from a 9 – 30VDC power supply, minimum rating of 1A.



Modem Configuration

Modem configuration is performed in 2 parts. First by creating a bridge connection between the Access Point Modem and the remote Client modems. This can be performed via the Quick Start menu of the Modems. Further details for setting up a bridge connection configuration can be found at end of this application note.

The second part of the configuration is setting up the RS485 communications for Profibus DP protocol.

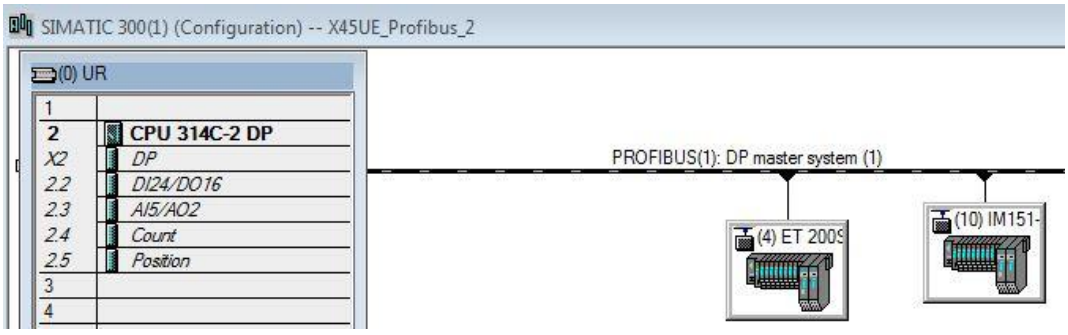
Under the Serial Link for each modem select the RS485 Serial Port Configuration as per below screen capture.

The 450U-E supports Profibus DP Serial Data Rates up to 19,200 if using a wide band radio and 9600 baud if using a narrow band radio.

Points to note:

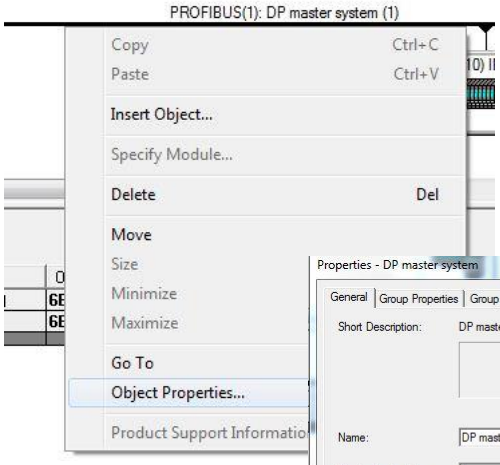
- Serial Baud Rate in modem must match PLC Baud Rate
- Data Format must be 8,E,1 – This is fixed in Profibus Devices
- Serial Gateway Mode is Multicast – This allows for Point to Point or Point to Multi Point links
- Multicast Group IP Address – This is not associated with the Wireless & Ethernet Port Addresses, this is only for the serial connections.

Siemens S7 300 PLC Configuration.



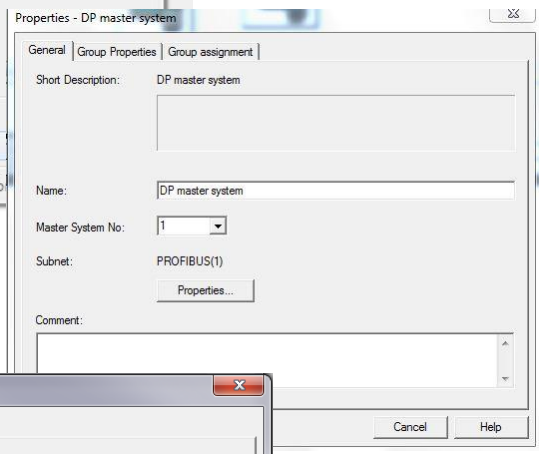
The above configuration shows a Profibus DP Master PLC with an ET200S Remote I/O devices connected to the Bus.

By editing the Object Properties of the Profibus Master you can change the bus parameters to suit the communication speed of the 450U-E Ethernet Modems.

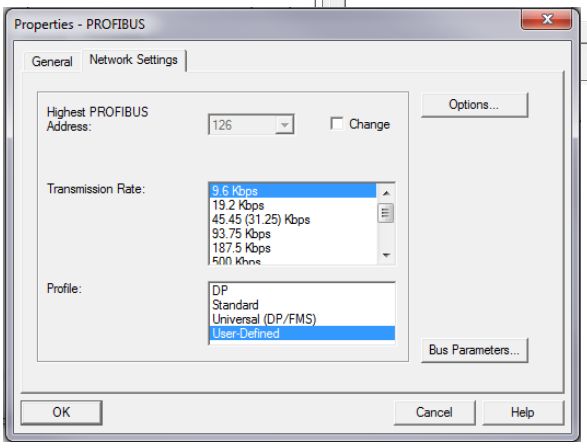


By right Clicking on the "**PROFIBUS(1): DP master system (1)**" bus line you can select the "**Object Properties**" menu item.

When Object "**Properties**" button



Properties Box appears select the



Select the "**Network Settings**" tab.

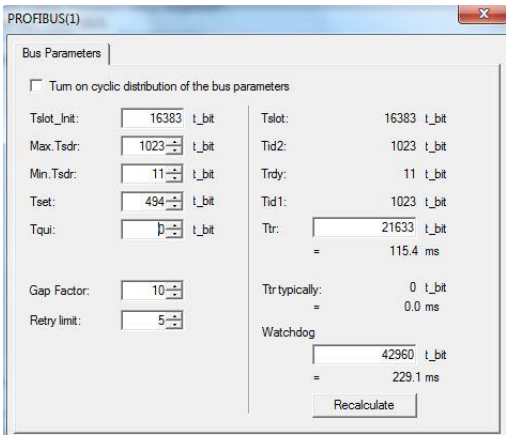
This will allow you to adjust the Transmission Rate parameter to suit the radio data rate on the Ethernet modem. This Baud rate must be the same as the Modems radio data rates, i.e. 9600 baud for Narrowband radios and 19,200 baud for Wide band radios.

Under Profile select "**User-Defined**" followed by pressing "**Bus Parameters**" button.

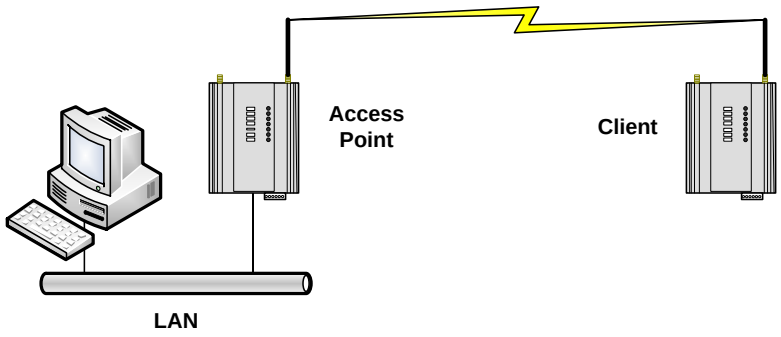
The Bus Parameter Fields allow for the adjustment of the Bus Timing and retries.

Set Parameters to match screen shot paying attend to the, **Tslot_Init, Max Tsdr** and **Retry limit**.

Typically these settings by default do not take into account delays introduced in a wireless network and so need to be slowed down.

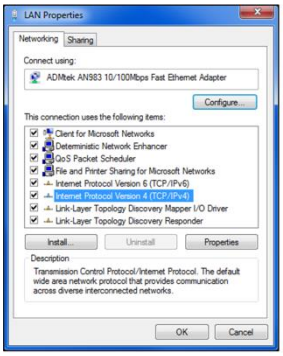


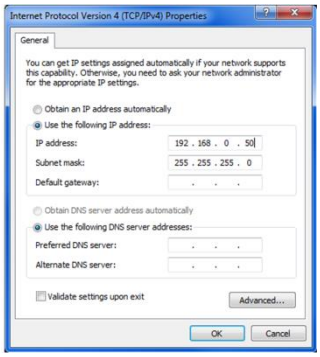
Configuration of a Bridge Network with 2 Radios.



This following is the recommended configuration required prior to setting up the modems for Profibus Communications.

1) Set the Run/Setup DIP switch on the bottom of the radio to the SETUP position
2) Connect a straight-through Ethernet cable to the RJ45 jacks of the PC and the radio.
3) Apply 24VDC power to the SUPPLY terminals on the radio.
4) Go to the PC's Control Panel, select "*Network and Sharing Center", "Change Adapter Settings"*and double click "*Local Area Connection"*, select Properties. **Windows 7 instructions, other versions will be similar but not identical**
5) Select "*Internet Protocol Version 4 (TCP/IPv4)"*, click properties.
6) Select "*Use the following IP address*:" and enter an IP address in the range -192.168.0.xxx (xxx can be 1-99). Make sure the chosen IP is not the same as the default IP on the modems.
7) Set the Subnet mask to 255.255.255.0



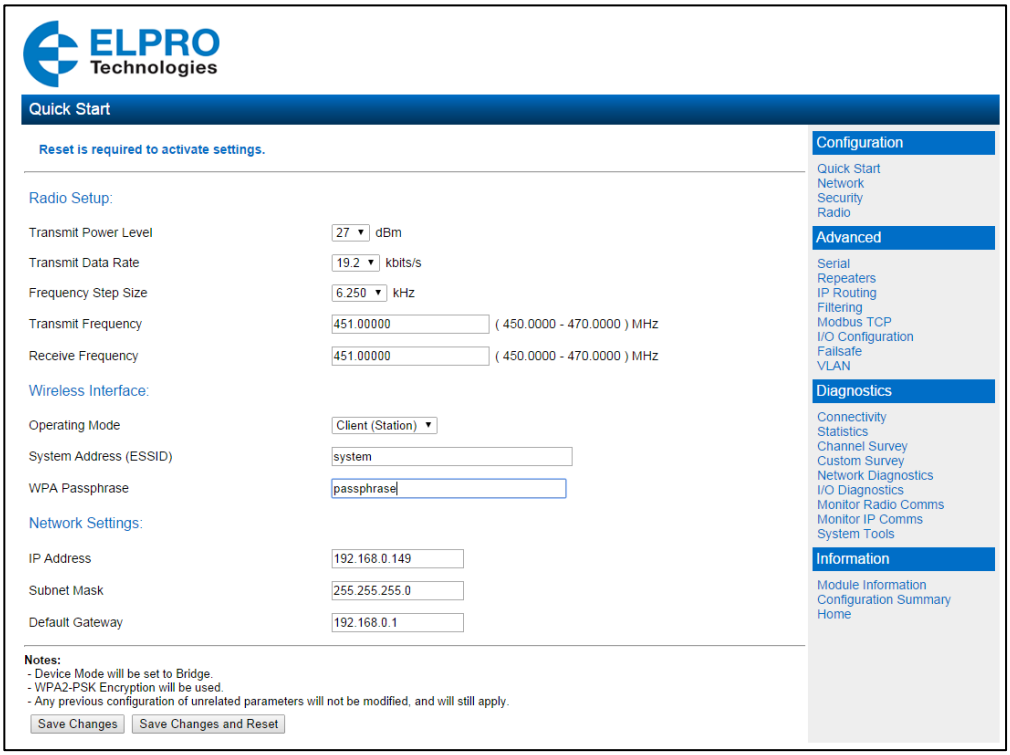


8) Run Internet Explorer version 7 or greater.
9) Enter the Setup IP address printed on the back label in the address bar. Do not include http, www, or any pre-fix.
10) Proceed through the security warnings and enter the user name and passwords of "*user"* and "*user"*. (case sensitive)
11) Put Run/Setup DIP switch back to the RUN position.

If radio has had some parameters changed, restoring the modem to factory defaults will ensure correct radio settings. This can be done by selecting "*System Tools ,Factory Default Configuration Reset"*.

12) From the Home Page select Quick Start from the right-hand column (see Quick Start Configuration screenshot below).
13) Assign the Operating Mode of the first modem to be the Access Point.
14) Enter the IP address as required for your network. Each radio must have a different IP address but typically be within the same subnet. (i.e. 192.168.0.120 and 192.168.0.121).

15) Create a unique System Address (ESSID) to be used for all radios. (Case sensitive).
16) If encryption is required, select an appropriate method and enter a passphrase. Record, as all radios must use the same method and passphrase. (Case sensitive).
17) Select the "*Save Changes and Reset" button*.
18) Repeat steps 11-16 on all other radios except make the operating mode a Client.
19) When all modems have restarted, connect antennas to the TX/RX port and confirm connection (Link LED is on).



Amendment Register:

Issue No.	Date	Details of Amendment
1.1	19/06/17	Draft Issue
1.2	4/1/19	Elpro branding