Application Note: 245/945U-E Profibus DP configuration

PURPOSE

The purpose of this document is to provide the reader with an application note for communicating Profibus DP with the 245U-E & 945U-E Ethernet Modems over RS485 serial connections.

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

This application note was written around a Point to Multi-Point configuration. However, the same settings can be used for a Point to Point configuration.

MATERIALS

The materials used for this application were,

Siemens S7 300 PLC, CPU 314C-2DP,
2x Siemens ET200S Remote I/O,
Step 7 Programming Software for programming PLC,
3 x 245U-E or 945U-E Ethernet Modems,
Windows PC with web browser, recommended Internet Explorer 7 or greater / compatible.
Straight through Ethernet cable for programming,
Suitable Power Supplies for powering modems and Profibus Equipment

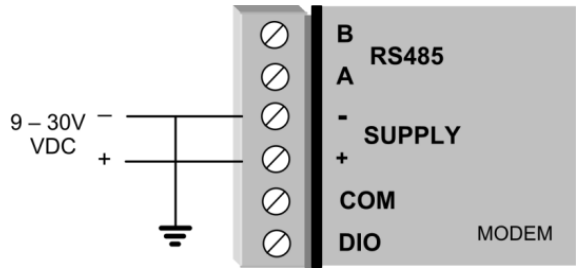
Profibus Communications Cable

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	

Power Connections

The 945U-E & 245U-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.

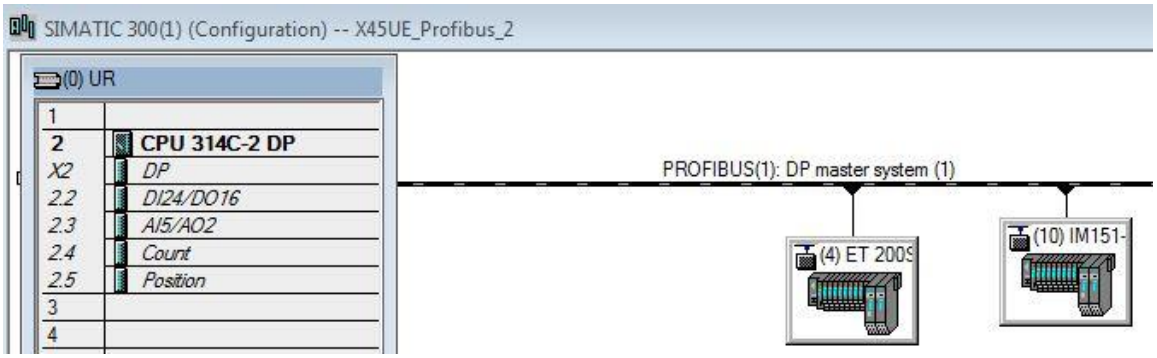
RS-485 Serial Port Configuration:	
RS-485 Port Type	Serial Gateway
Data Rate	187500
Data Format	8E1
Flow Control	None
RS-485 Serial Gateway:	
Serial Gateway Mode	Multicast
Character Timeout (msec)	1
Packet Size (bytes)	500
Multicast Group Port	5003
Multicast Group IP Address	224.0.1.0 (range 224.0.1.0 to 238.255.255.255)

The 945U-E and 245U-E supports both 187.5Kbps & 93.75Kbps Profibus DP Serial Data Rates.

Points to note:

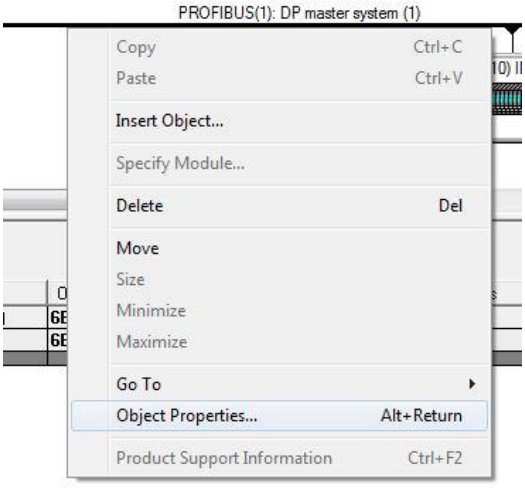
Serial Baud Rate in modem must match PLC Baud Rate
Data Format must be 8, E,1 – This is fixed in Profibus Devices
Serial Gateway Mode is Multicast – This allows for Point to Point or Point to Multi Point links
Multicast Group IP Address – This is not associated with the Wireless & Ethernet Port Addresses,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

Siemens S7 300 PLC Configuration.



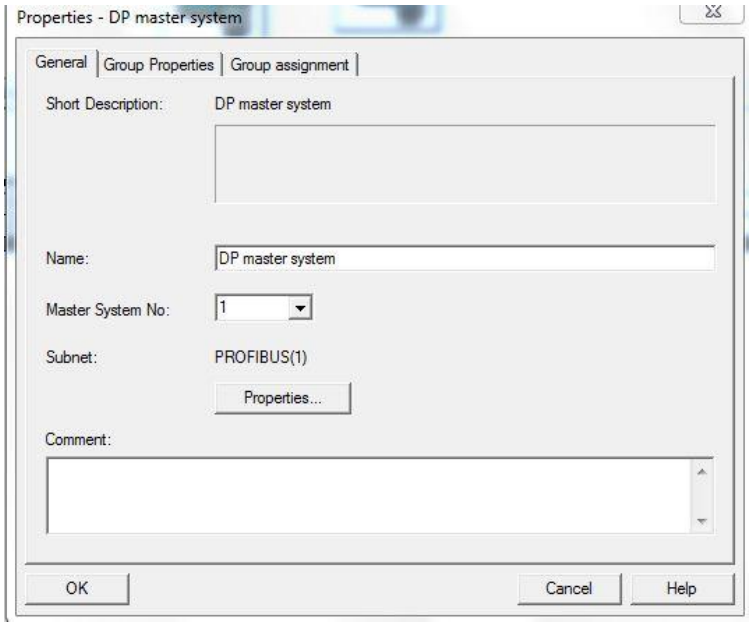
The above configuration shows a Profibus DP Master PLC with 2 x ET200S Remote I/O devices connected to the Bus.

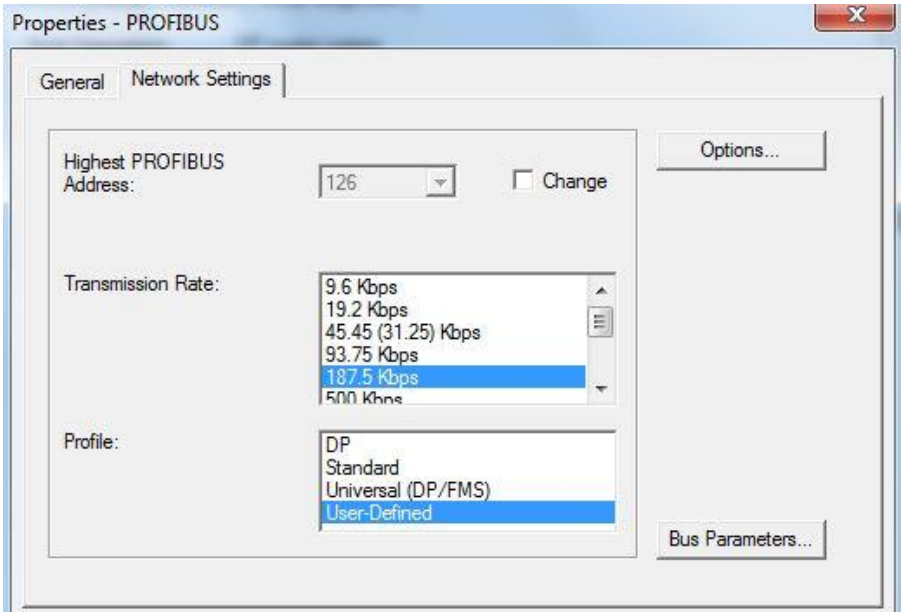
By editing the Object Properties of the Profibus Master you can edit the bus parameters to suit application to be used of the 945U-E or 245U-E Ethernet Modems.



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

When Object Properties Box appears select the "**Properties**" button

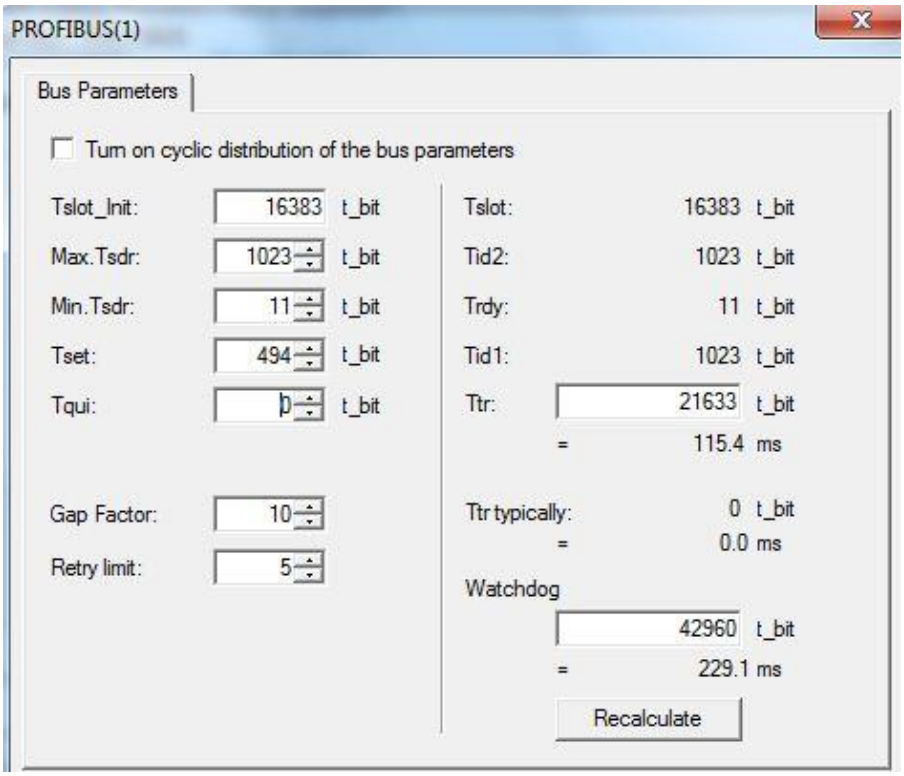




Once Properties button has been selected, select the "**Network Settings**" tab.

This will allow the adjustment of Serial Baud rate parameters. This Baud rate must be the same Baud Rate as set in the Modems configuration.

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

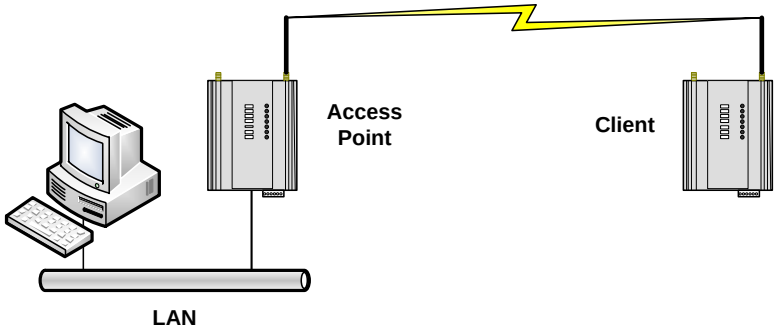


The Bus Parameter Fields allow for the adjustment of the Bus Timing and retries.

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

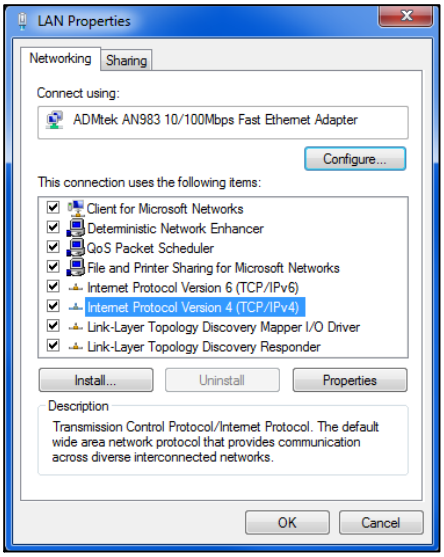
Typically, these settings by default do not take into account delays introduced in a wireless network.

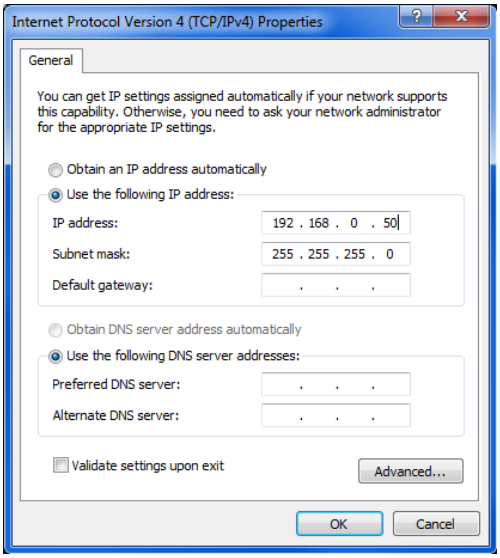
Configuration of a Bridge Network with 2 Radios.



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", 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



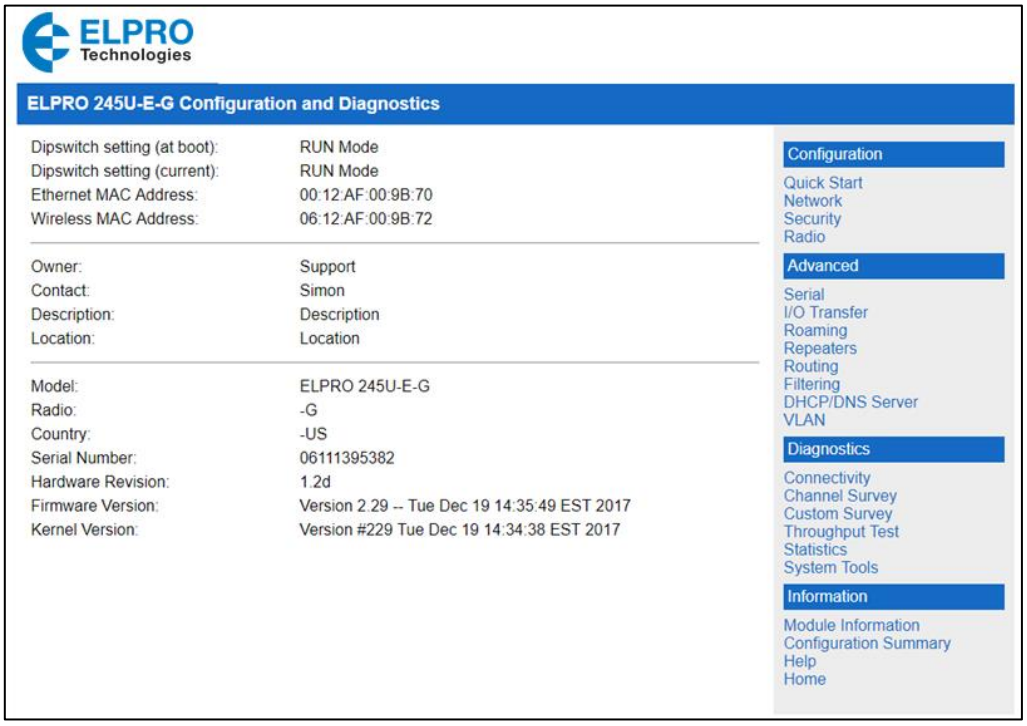


8) Run Internet Explorer version 7 or greater.
9) Enter the Setup IP address printed on the back label in the address bar. Do not include http, www, or any pre-fix.
10) Proceed through the security warnings and enter the user name and passwords of "user" and "user". (case sensitive)

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
1.0	10-08-12	Initial Issue
1.1	04-01-2019	Elpro Branding