Connecting UniOP Using Simatic S7 Ethernet

This Technical Note contains the information needed to connect UniOP to Siemens Simatic S7 controllers on the Ethernet network using the Simatic Net protocol.
The “Simatic S7 ETH” protocol is associated to the Designer 6 file `D32uplc178.dll`.

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1. Introduction

The UniOP operator panels can be connected to Siemens Simatic S7 controllers using Ethernet.

The Simatic controller must either have an on-board Ethernet port or be equipped with an appropriate Ethernet interface (for instance the CP343-1 for the S7-300 or the CP443-1 for the S7-400).
The following Simatic Ethernet communication processors can be used for communication:
CP343-1
CP343-1 IT
CP343-1 PN
CP443-1
CP443-1 IT
The communication is based on the PG/OP communication functions supported by the CP units.

To select Ethernet communication with the Simatic S7, choose the communication driver 'Simatic S7 ETH' in the 'Configure Controller…' dialog box of Designer.

The operator panel must be equipped with the optional SCM11 communication module to support Ethernet TCP/IP communication.
UniOP currently supports only 10 Mb Ethernet over twisted pair.

Note: *The TCM10 Ethernet module cannot be used for connection to the Simatic S7 PLCs.*

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2. Configuration with Designer

The UniOP project file must be properly configured for Ethernet communication with Simatic controllers.

2.1 Panel Setup

The UniOP panel must be assigned a unique IP address. The IP address of the panel must be entered in the Panel Setup dialog box under the tab “External Devices”.
Enter the IP address in the field “Ethernet Board” as shown in Figure 3 below.

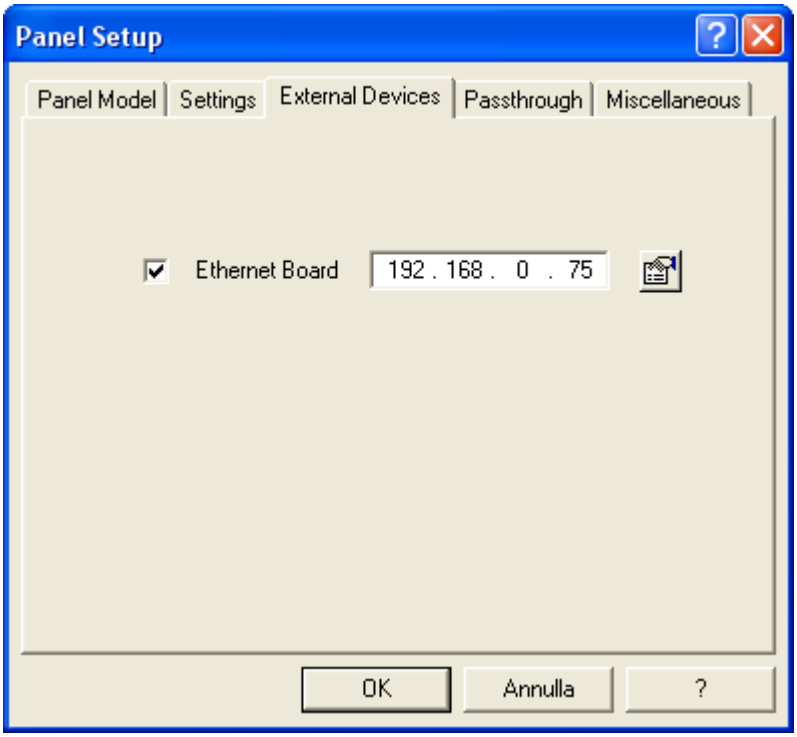

Figure 1 – IP Address in Panel Setup

2.2 Controller Setup

Figure 2 shows the Designer Controller Setup dialog box for the Simatic S7 ETH driver.
The Ethernet address of the controller connected to the operator panel must be entered in the “IP address” field.

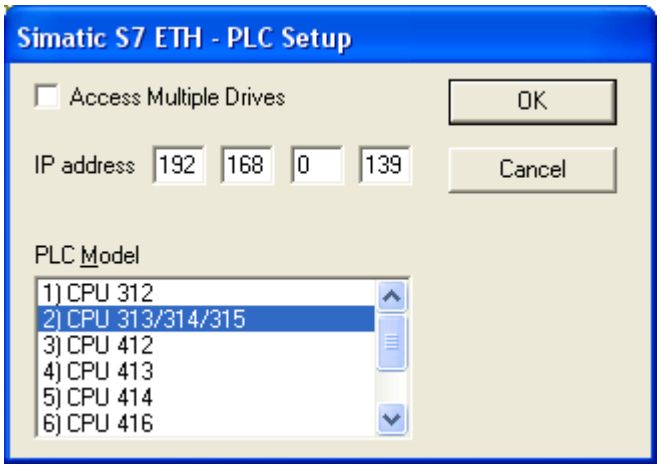

Figure 2– Controller Setup dialog box

The protocol implementation supports the connection of multiple controllers to one operator panel, as shown in Figure 3. To set-up multiple connections, check the "Access Multiple Drives" checkbox in the Controller Setup dialog box, see Figure 2.

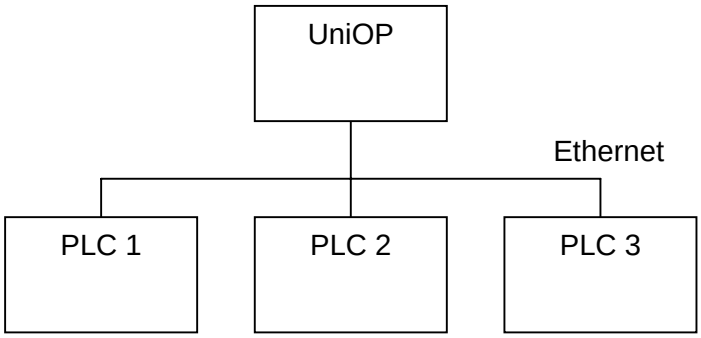

Figure 3– Multiple controller connection

More than one operator panels can be connected to the same PLC.
Please note that Simatic can support a limited number of active connections at any time. One operator panel connected to the PLC using Ethernet is using one connection.
Make sure you the number of connections of one controller is not exceeded.
The number of available connections differs from one Simatic CPU type to another. Please refer to the appropriate documentation for detailed information.

2.3 RDA Setup

The Real Time Clock information in the Reserved Data Area (RDA) is coded in BCD and is arranged as shown in Table 1.

MBn	Day of the week
MBn+1	0
MBn+2	Month
MBn+3	Day
MBn+4	Hour
MBn+5	Year
MBn+6	Seconds
MBn+7	Minutes

Table 1. RTC information in the RDA

The page number displayed and the page number requested in the RDA are coded in binary.
The RDA can be freely positioned within the PLC memory.

For the parts of the RDA organized in bits (Keyboard Status, LED Control, Alarms, UniOP Status Word and PLC Command Word), the first bit in the RDA corresponds to the first bit in the PLC (i.e. the bit with the lowest address). For example, if the Keyboard Status area is positioned at address MB0, then the key F1 will be mapped to M0.0, the key F8 will be mapped to M0.7 and so on as listed in Table 2.

	.7	.6	.5	.4	.3	.2	.1	.0
MB0	F8	F7	F6	F5	F4	F3	F2	F1
MB1	F16	F15	F14	F13	F12	F11	F10	F9

Table 2. RDA bit information

Similarly, if the UniOP Status Word is positioned at the address MB12, then the status bit S0 will be mapped to M12.0, the bit S7 will be mapped to M12.7 while the bit S8 will be mapped to M13.0.

3. PLC Configuration

The Simatic S7 system must be properly configured for Ethernet communication using the Siemens STEP7 software.
The Figure 4 below shows an example of hardware configuration of an S7-300 system using STEP7.

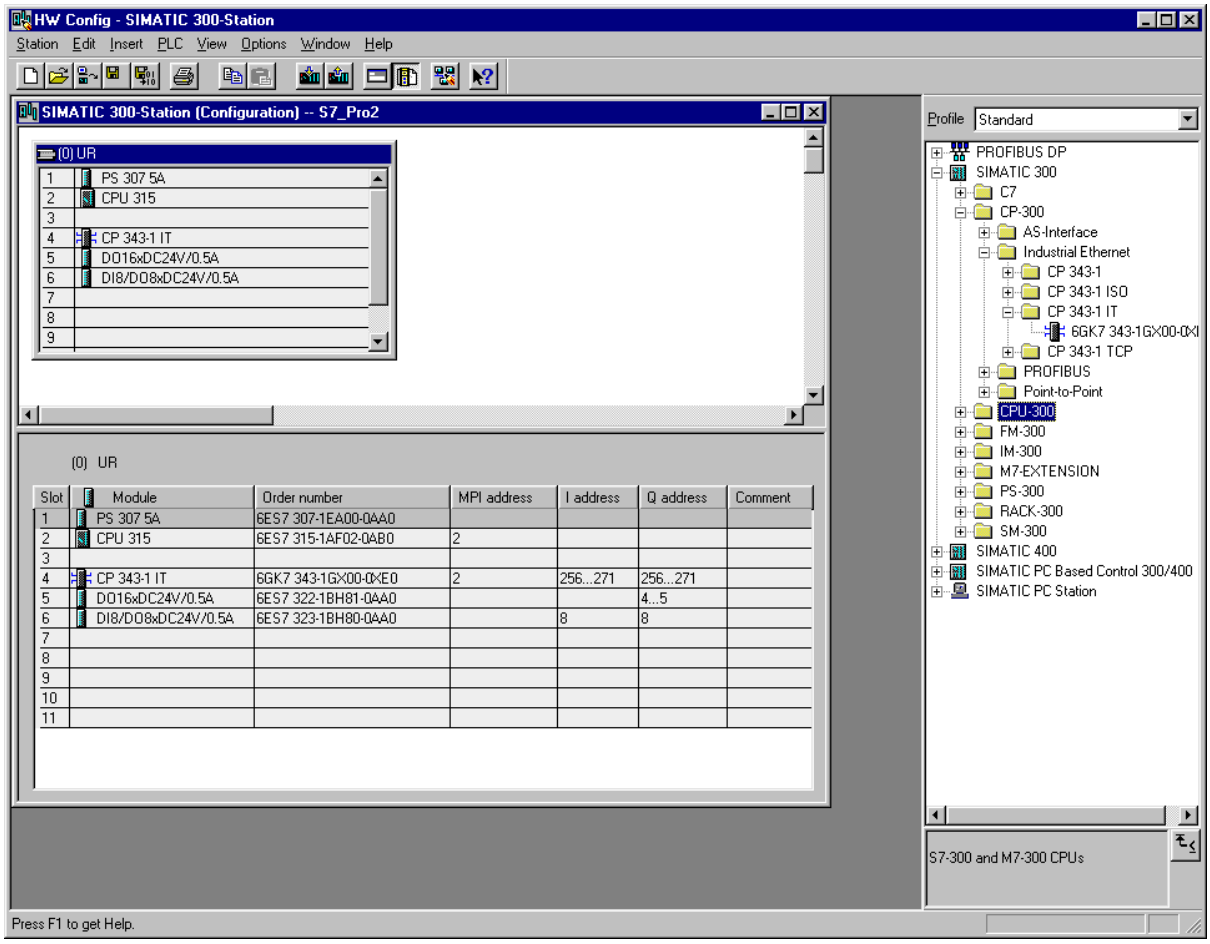

Figure 4

4. Converting Designer Projects

Project files created using the Simatic S7 MPI driver can be converted for use with Ethernet without any loss of information.
The opposite conversion is possible as well.

Appendix A. Communication Error Codes

The System Menu shows the current communication status of the panel.
A message and a numeric error code report the communication status.
The message describes the current communication status. The number shows the code of the current communication error or, if the communication is correct, the code of the last error encountered. When the error code 0 is shown, it means there have been no communication errors since this system start-up.

Code	Description	Notes
0	**No error**	There are no communication errors and there have been no errors since start-up.
4	**NAK response**	The request sent to the PLC was not valid and the PLC responded with a NAK
5	**Connection timeout**	Failed to connect to PLC
6	**Response error**	Unexpected response length
7	**General communication error**	UniOP cannot open the socket for communication with the PLC.
8	**Response timeout**	Failed to decode the PLC response or the PLC did not respond to the request within the timeout interval
10	**Unexpected response format**	
16	**Protocol error**	Error in the encapsulated protocol layer

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