

# SIEMENS

## TDC 以太网通讯

TDC Ethernet communication

Getting-started

2004-01

**摘要** 本文描述了 SIMATIC TDC 控制系统 与 S7 PLC 之间通过工业以太网进行通讯的整个过程，其中包括 TDC 和 PLC 的硬件组态，TDC 侧 CFC 块的参数设置，PLC 侧连接的建立及编程。

**关键词** 工业以太网，硬件组态，CFC，连接，PLC 编程

**Key Words** IE, HW Configuration, CFC, Connection, PLC Programming

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## 1. TDC IE communication introduction

TDC system is the newest digital control system of SIMADYN D family and it has the highest quality in the SIMATIC control system family.

As one part of TIA family it has powerful communication function. The system provides the MPI communication protocol, Profibus communication protocol, Ethernet communication protocol. It is easy to communicate with other simatic product, for example S7-300, S7-400, HMI and drives product.

For Ethernet communication, the hardware platform is CP51M1 which supply a standard RJ45 Ethernet interface; the old interface CP5100 is discontinued as per Aug. 1 2005.

For communication task, system can exchange process data with other TDC system or PLC S7 system through CP51M1 module.

For communication protocol, TDC system supplies TCP/IP protocol and/or UDP protocol.

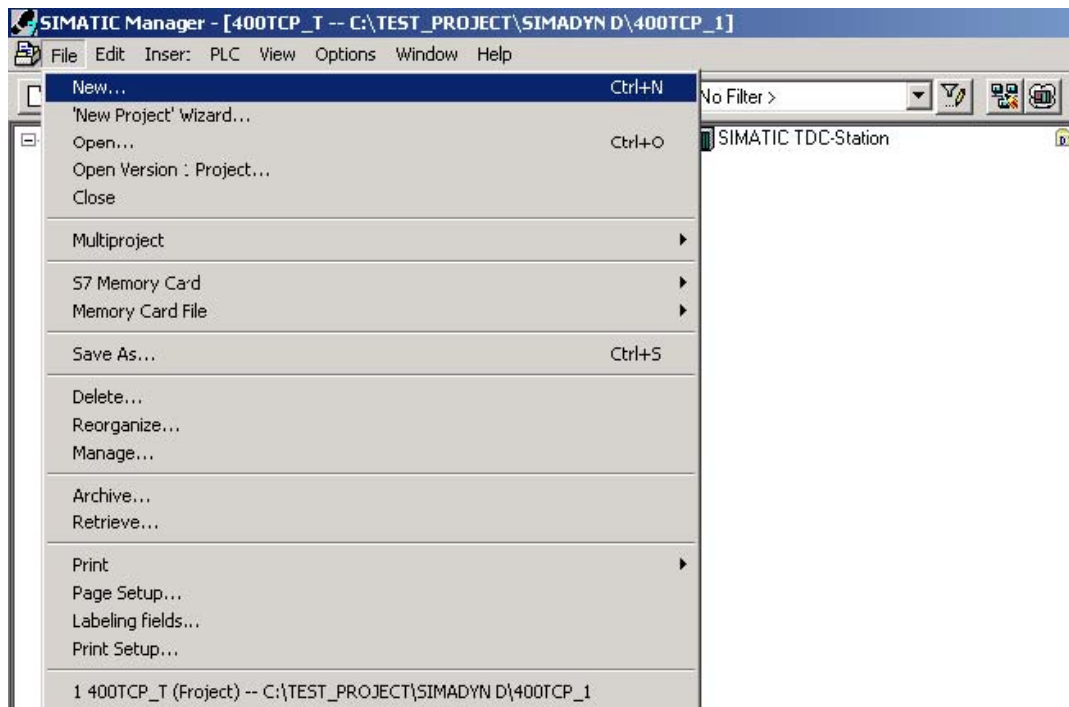
For transfer modes, refresh mode, handshake mode, multiple mode and select mode are available for selection.

For net speed it can work with 10Mbit and 100Mbit network, the module can automatically sense the net speed.

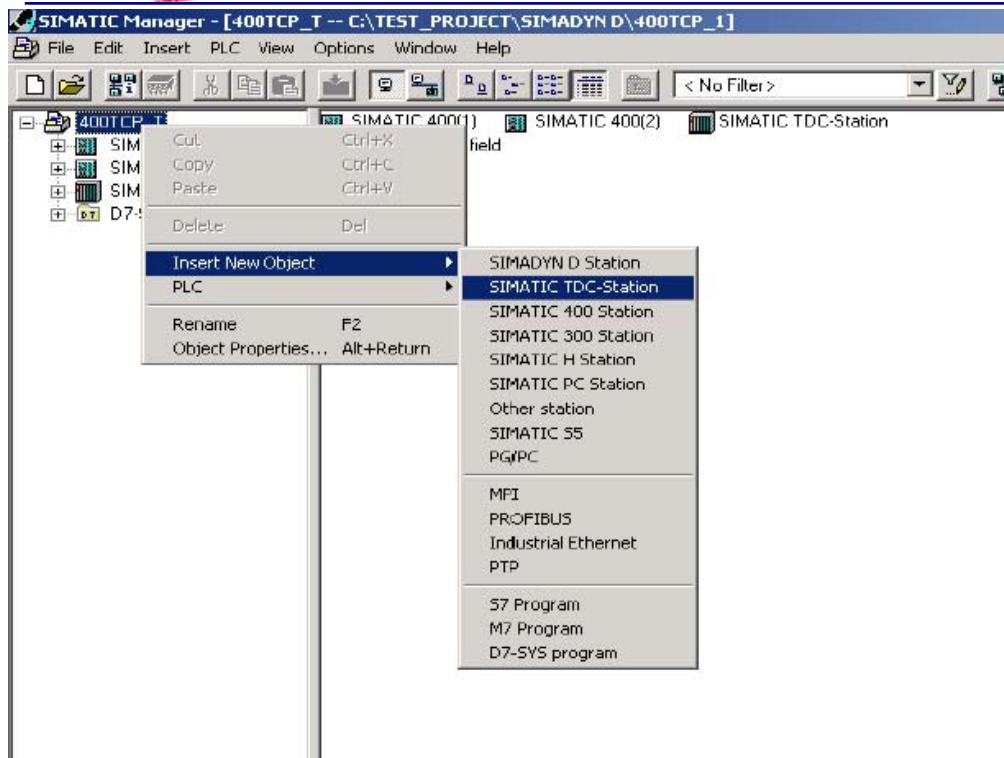
## 2. TDC configuration steps

### 2.1 Hardware configuration in SIMATIC Manager

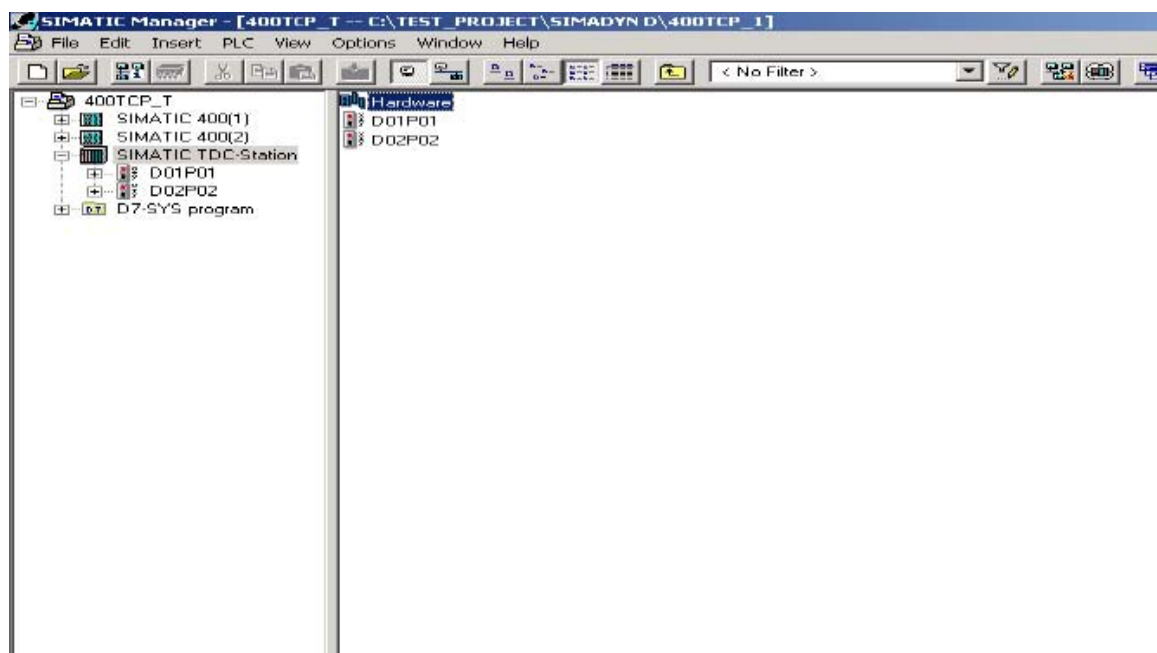
#### 2.1.1 Create a new S7 project



#### 2.1.2 Insert a TDC station



2.1.3 Select hardware configuration in SIMATIC Manager, double click to open it



2.1.4 Insert the subrack, CPU, communication board CP51M1 and other module from the hardware catalog

Keep the same type with which is used in the sub rack.

Slot	Name	Type	Order number
1	D01P01	CPU550	6DD1600-0BA0
1.1	D01_1	MC521	6DD1610-0AH3
2	D02P02	CPU550	6DD1600-0BA0
2.1	D02_1	MC521	6DD1610-0AH3

### 2.1.5 Define the CPU module and communication module properties

Properties - CPU550

Properties | Addresses | Basic clock cycle | Cyclic tasks | Alarm tasks

Sampling times (T0: 1.0 ms)

Parameter	Value	Unit	Multiplier
T1	1.0	ms	(1 x T0)
T2	2.0	ms	(2 x T0)
T3	64.0	ms	(64 x T0)
T4	128.0	ms	(128 x T0)
T5	1024.0	ms	(1024 x T0)

For CP51M1, we need to define the module name firstly

The screenshot shows the SIMATIC Manager HW Config interface. A 'Properties - CP5100' dialog box is open, displaying the following information:

- Shortname: CP5100
- Description: Industrial Ethernet module for TCP/IP and UDP, auto-sensing 10 Mbit/100 Mbit
- Order No.: 6DD1661-0AE0
- Name: **D1800C**
- Interface Type: Ethernet
- Address: 140.80.0.2
- On net: -

The background shows a rack configuration for station (0) A000 with slots 1 through 18. Slot 16 contains module D1600C, and slot 18 contains module D1800C.

For Ethernet property we need to define the IP address and subnet mask

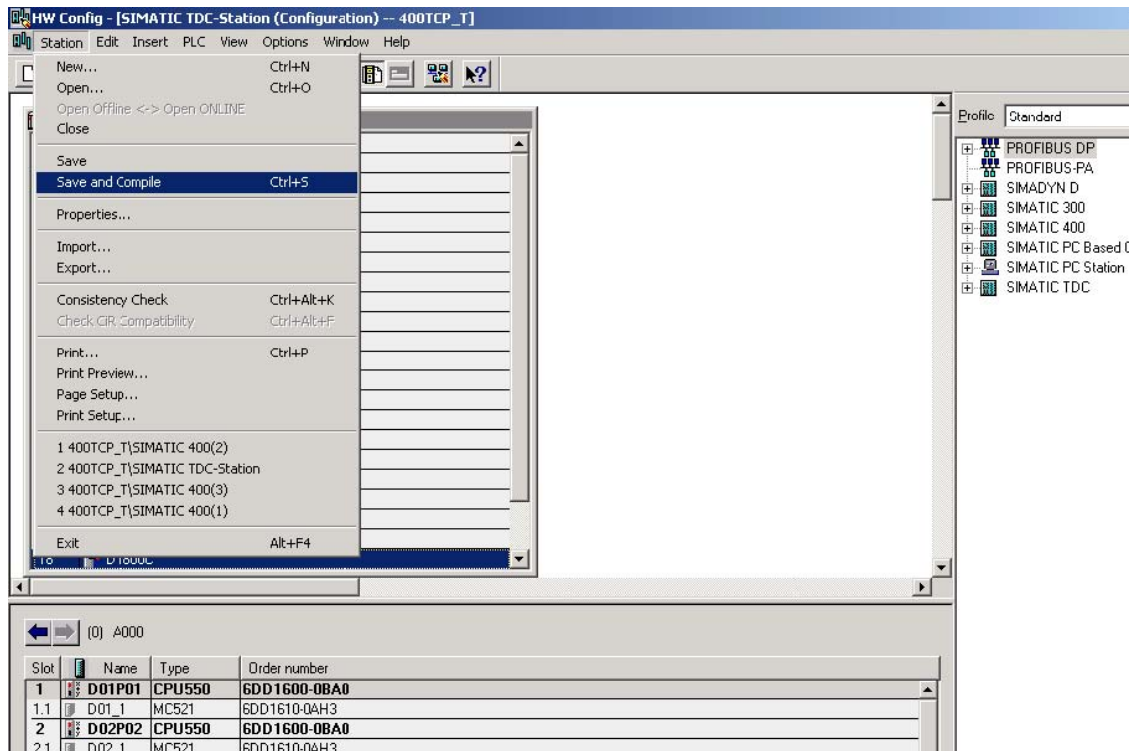
The screenshot shows the 'Ethernet interface CP5100 Properties' dialog box with the 'General' tab selected. The configuration is as follows:

- IP-Address: **140.80.0.2**
- Subnet mask: **255.255.0.0**
- Router:  Use no router
- Use router (Address: 000.000.000.000)

The background shows the same rack configuration as the previous screenshot, with slot 18 highlighted.

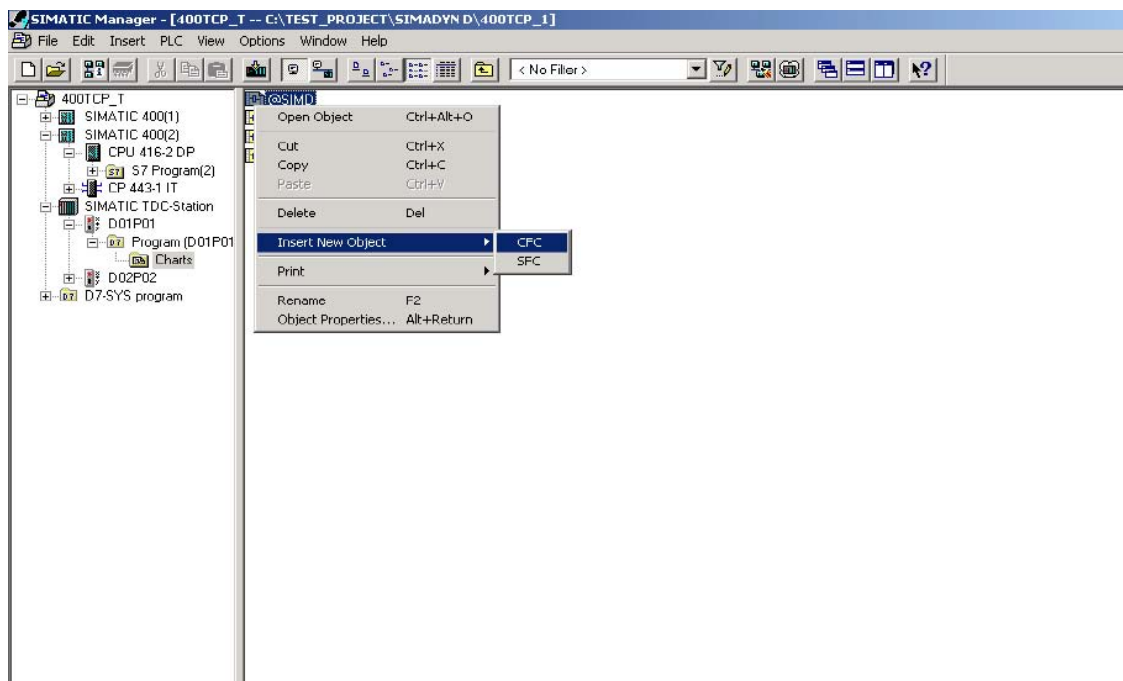


## 2.1.6 Save and compiled the hardware configuration

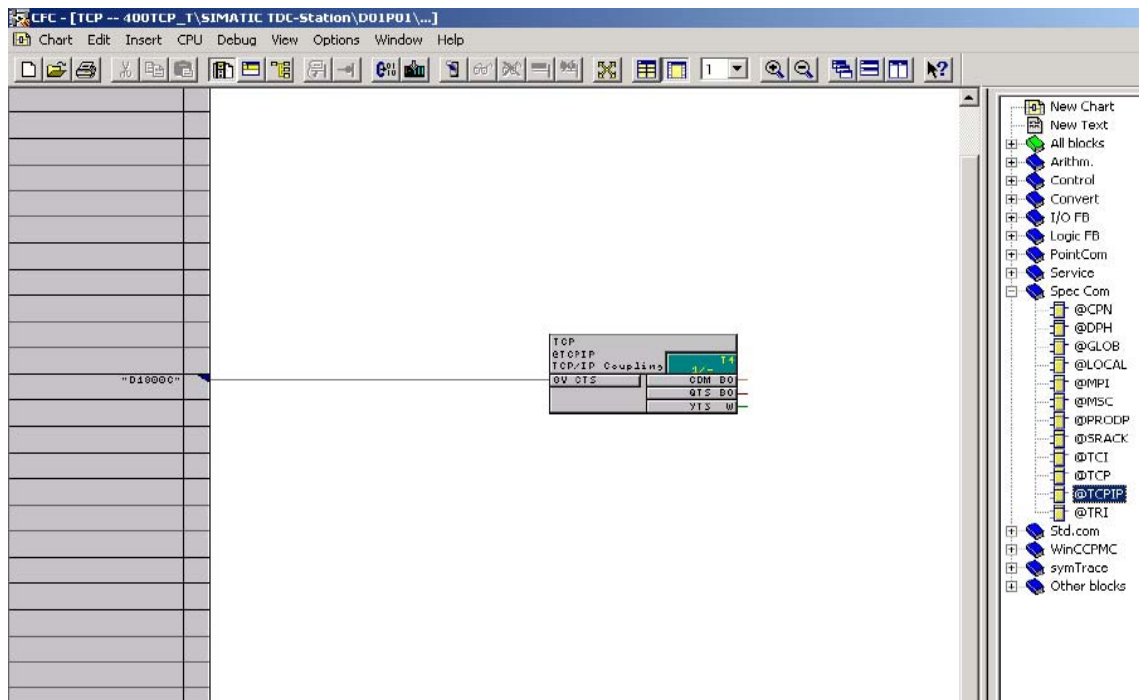


## 2.2 CFC programming

### 2.2.1 Insert a CFC program in SIMATIC Manager, double click it to open it

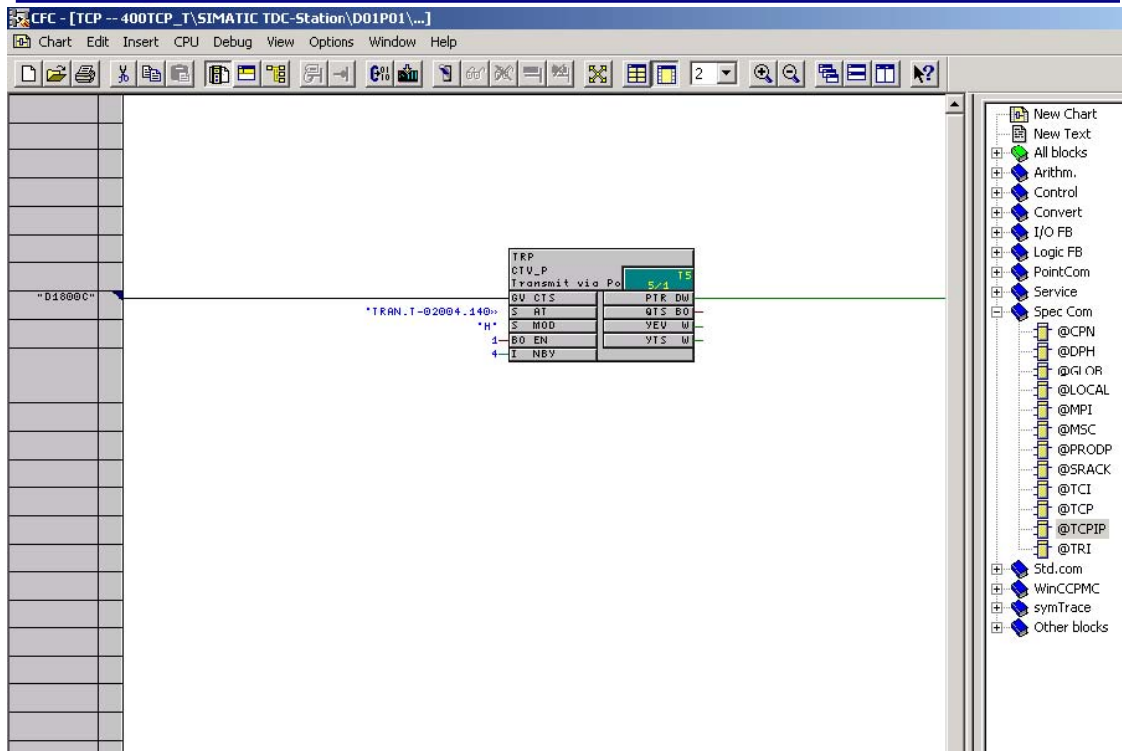


2.2.2 Insert the TCPIP communication block into the chart, define the connection address which is set in the hardware configuration and select the proper cycle time



2.2.3 Insert the send function block CTV\_P, define the connection:

- CTS P51M1 hardware address which is set in hardware configuration
- AT channel name.protocol type–CP51M1 port number.partner IP address–partner port number, for example: 'TRAN.T-02004.192168000003-02002'
- MOD normally we select handshake mode
- EN set to 1 to enable the FB
- NBY define the telegram length in bytes

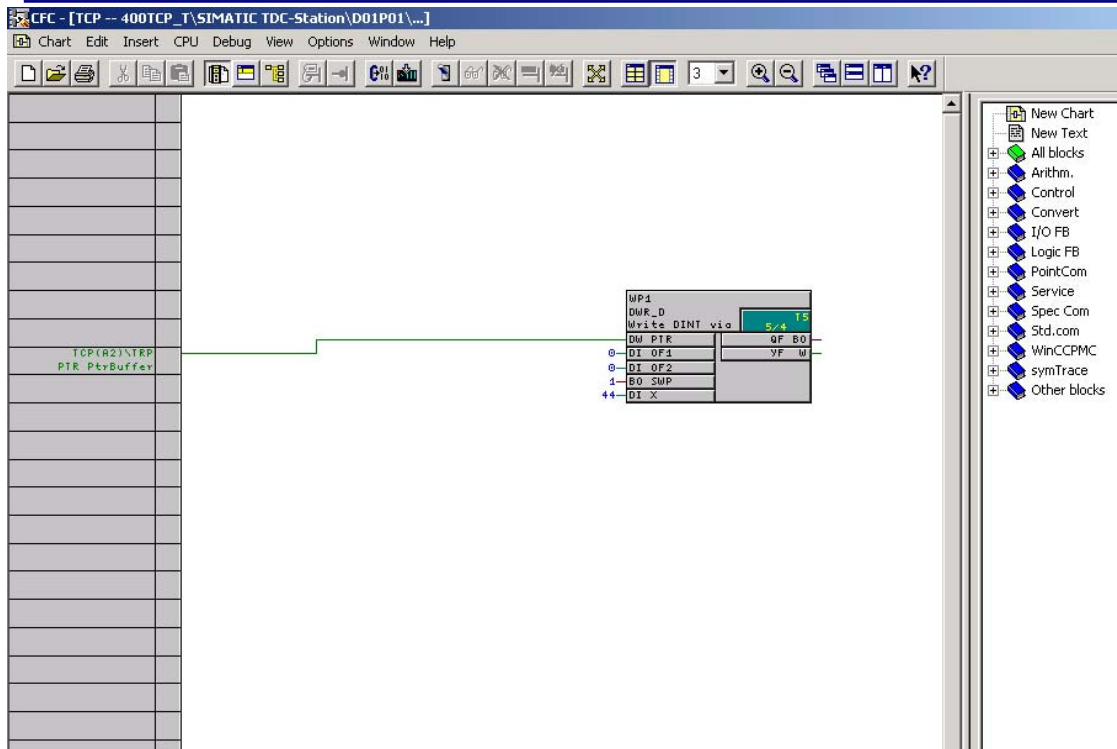


## 2.2.4 Insert the DWR\_D block to write the communication content to the communication buffer

Here we can define the offset in the communication buffer by set connector1/2. The final result is the sum of offset1 and offset2.

For connector SWP we set it to 1 if it communicates with a PLC.

The data we try to send is set in connector X, here is 44 as an example.



For receive part, we can do it in the same way.

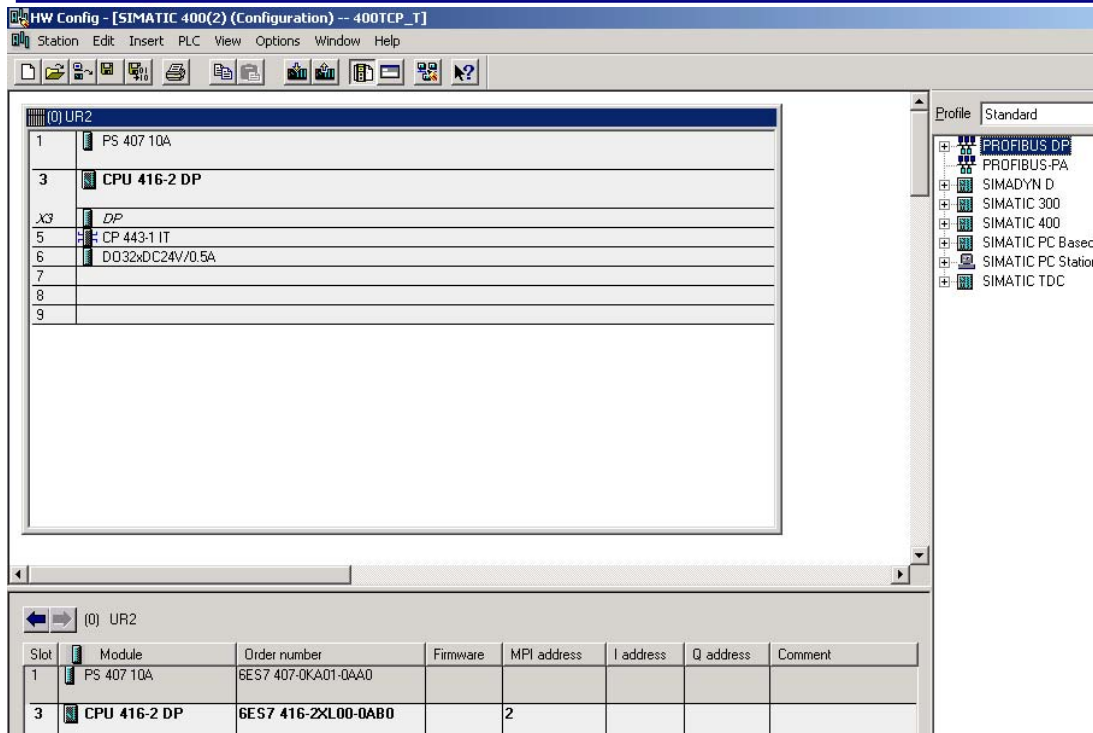
For connector AR of CRV\_P, we do not need to define the partner IP address–partner port number.

2.2.5 Compiled the program and download it to the memory card and restart the system

### 3. S7-400 configuration steps

#### 3.1 S7 hardware configuration

First insert the S7-400 station, and then open the hardware configuration to insert the modules which are available on the sub rack.

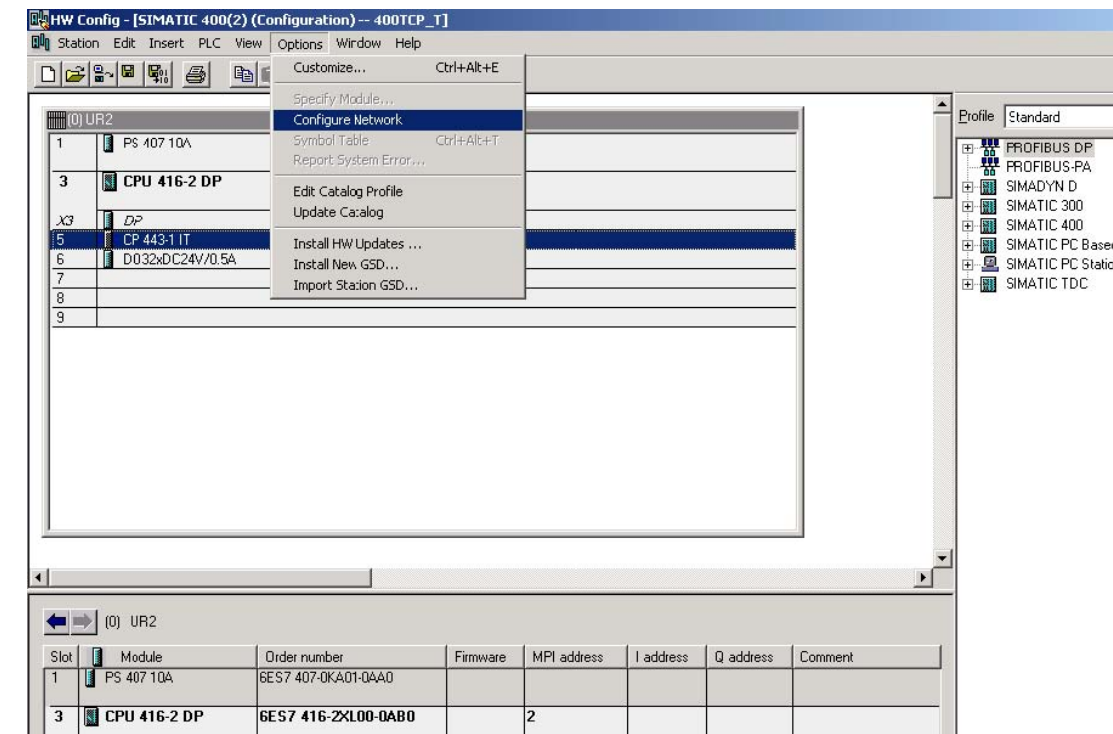


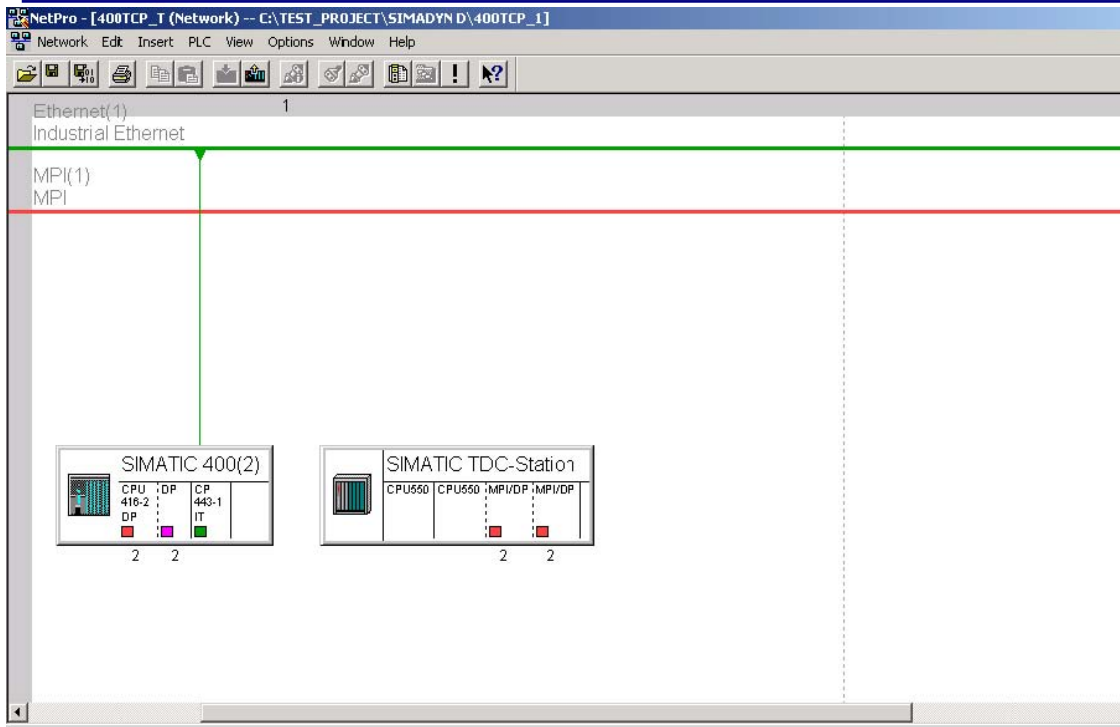
For CP443-1 module we need to define the IP address and subnet mask.

The IP address will be used in the CFC program.

### 3.2 network configuration in the Netpro software

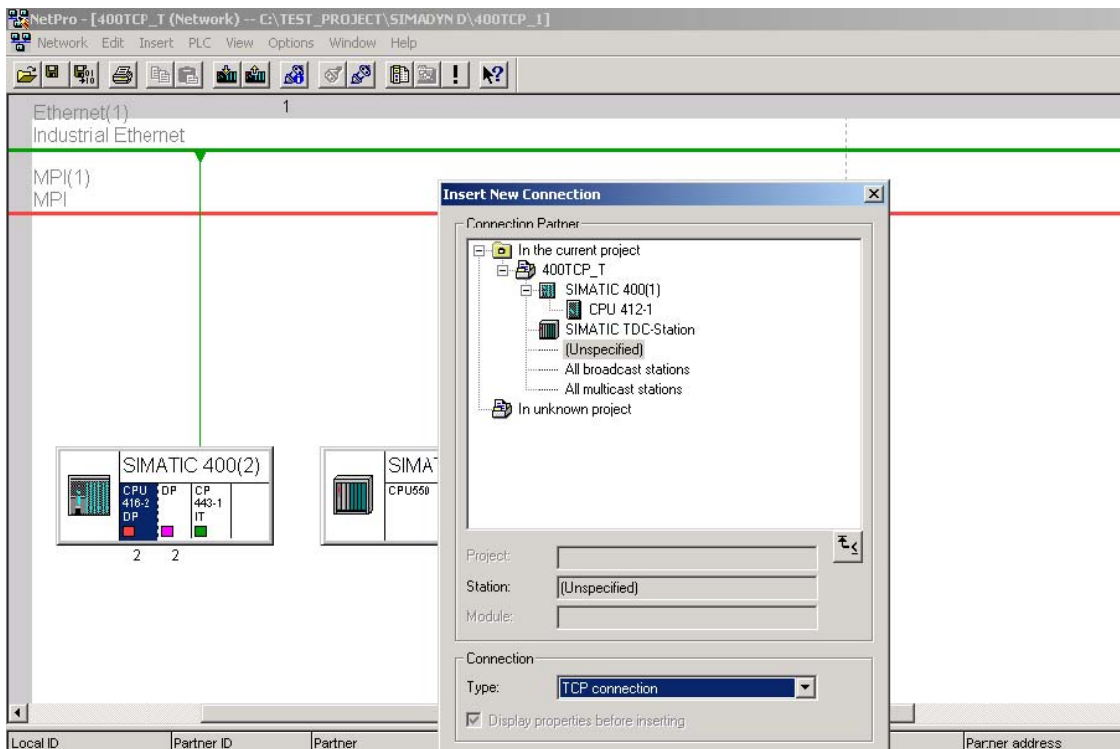
Open Netpro under hardware configuration menu





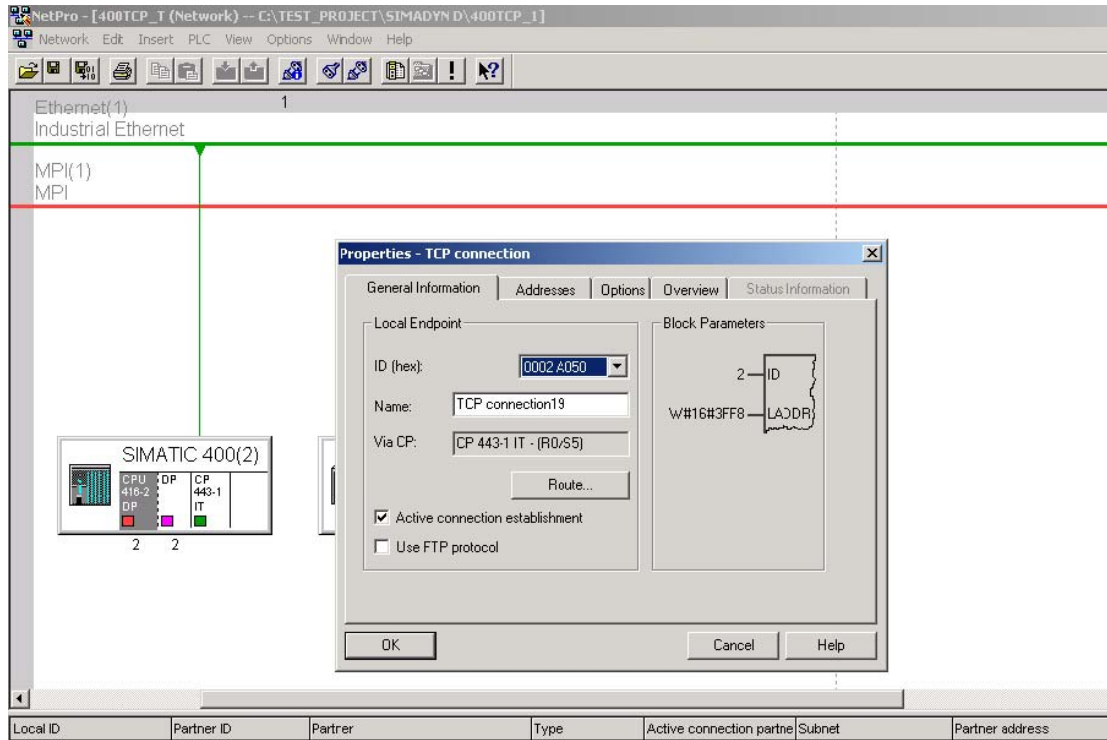
To display the connection table, please select a module capable

Select the CPU in the SIMATIC station and insert a new connection,  
Select unspecified station and  
TCP connection, press apply button.

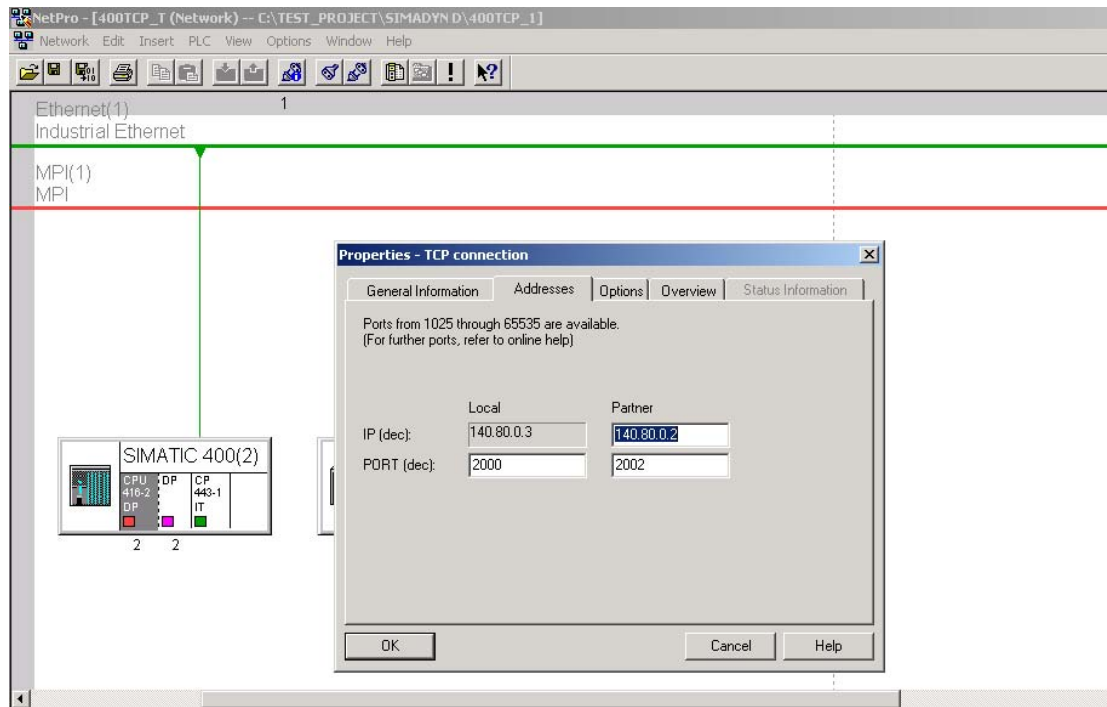


Select the ID number, record the address LADDR.

Both of them will be used in the S7 program.



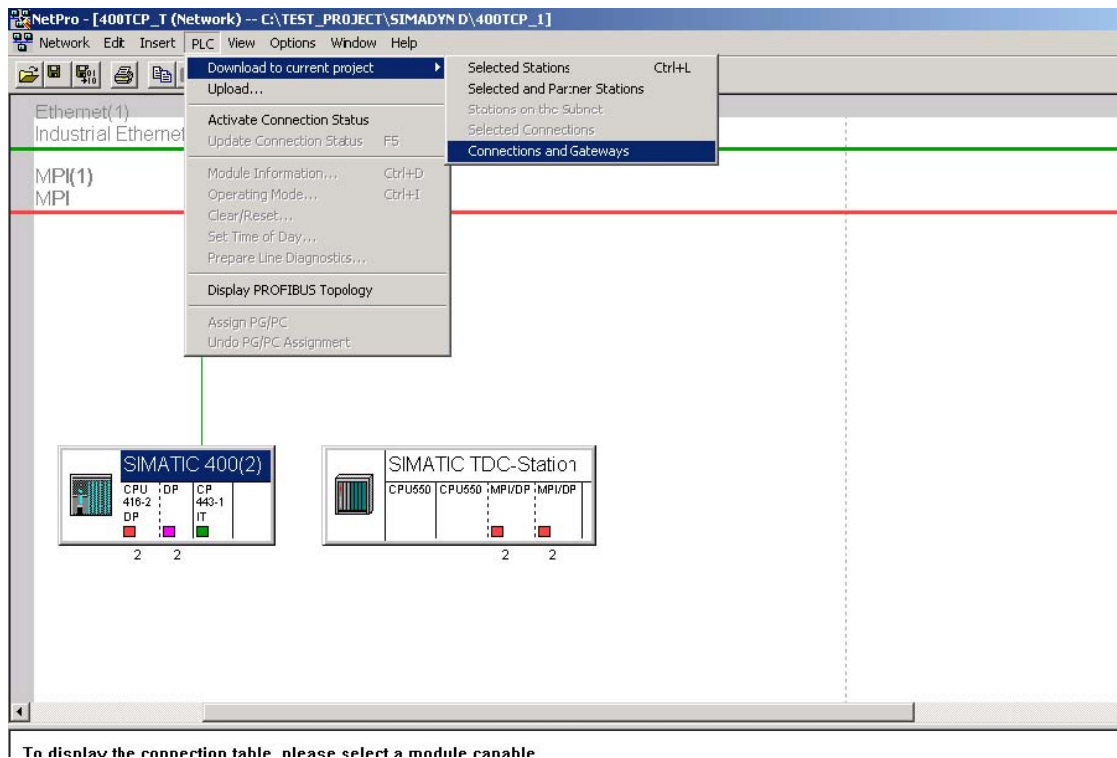
Under address menu we need to set the local port number, partner address and port number, press OK button to confirm the setting.



For other connection you need, you can do it in the same way.

Then we need to save and compile the configuration.

We need to download not only the hardware configuration, but also the Netpro configuration to the CPU.



### 3.3 Programming in the S7 CPU

For the industrial Ethernet communication we use the FC5 AG\_SEND, FC6 AG\_RECV block.

These blocks transfer and receive the data on the configured TCP connection to and from the Ethernet CP.

Here we made two FC separately for send and receive function, one is FC 30 for FC5, and another is FC31 for FC6.



SIMATIC Manager - [400TCP\_T -- C:\TEST\_PROJECT\SIMADYN D\400TCP\_1]

File Edit Insert PLC View Options Window Help

< No Filter >

Object name	Symbolic name	Created in language	Type	Size in the work me...	Author	Name (Heade
System data	---	---	SDB	---	---	---
DB1		STL	Organization...	68		
DB35	CYC_INT5	STL	Organization...	40		
FC5	AG_SEND	STL	Function	576	SIMATIC	AG_SEND
FC6	AG_RECV	STL	Function	522	SIMATIC	AG_RECV
FC30		STL	Function	148		
FC31		STL	Function	132		
DB30		DB	Data Block	2040		
DB31		DB	Data Block	2040		
VAT_1	VAT_1		Variable Table	---		

LAD/STL/FBD - [OB1 -- 400TCP\_T\SIMATIC 400(2)\CPU 416-2 DP]

File Edit Insert PLC Debug View Options Window Help

'Contents Of: 'Environment\interface'

OB1 : "Main Program Sweep (Cycle)"

Comment:

Network 1: Title:

Comment:

```

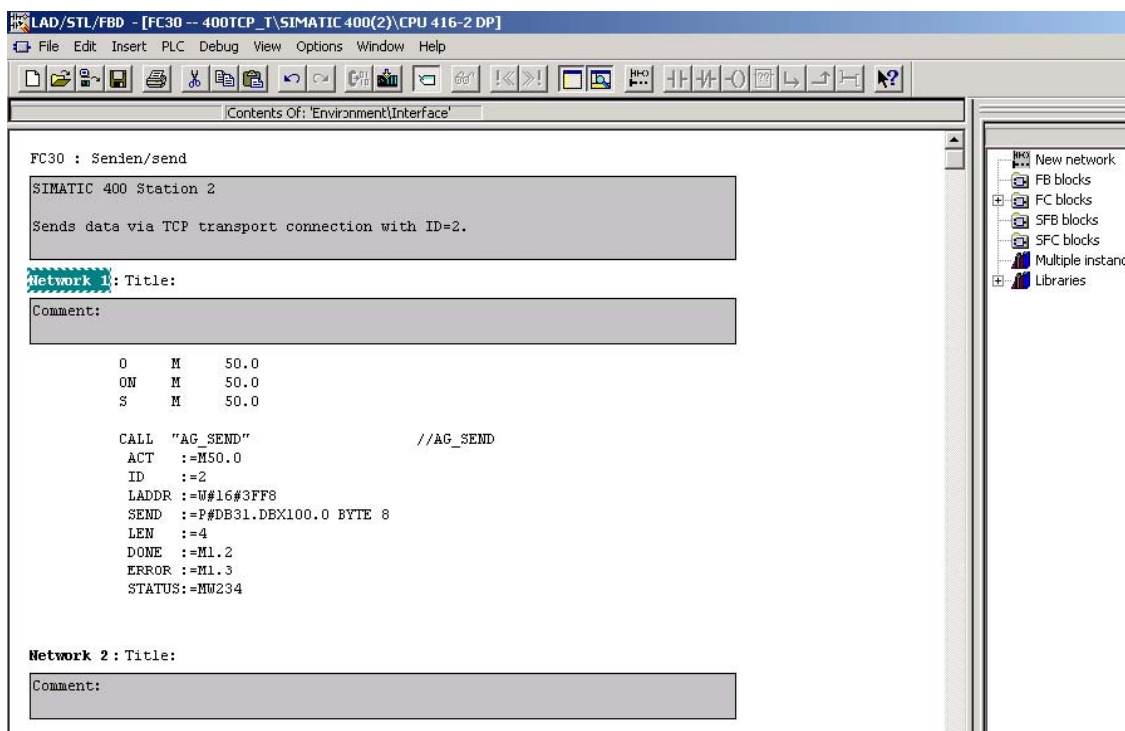
CALL FC 31          // RECV
CALL FC 30          // SEND
NOP 0
    
```

- New network
- FB blocks
- FC blocks
- SFB blocks
- SFC blocks
- Multiple instances
- Libraries

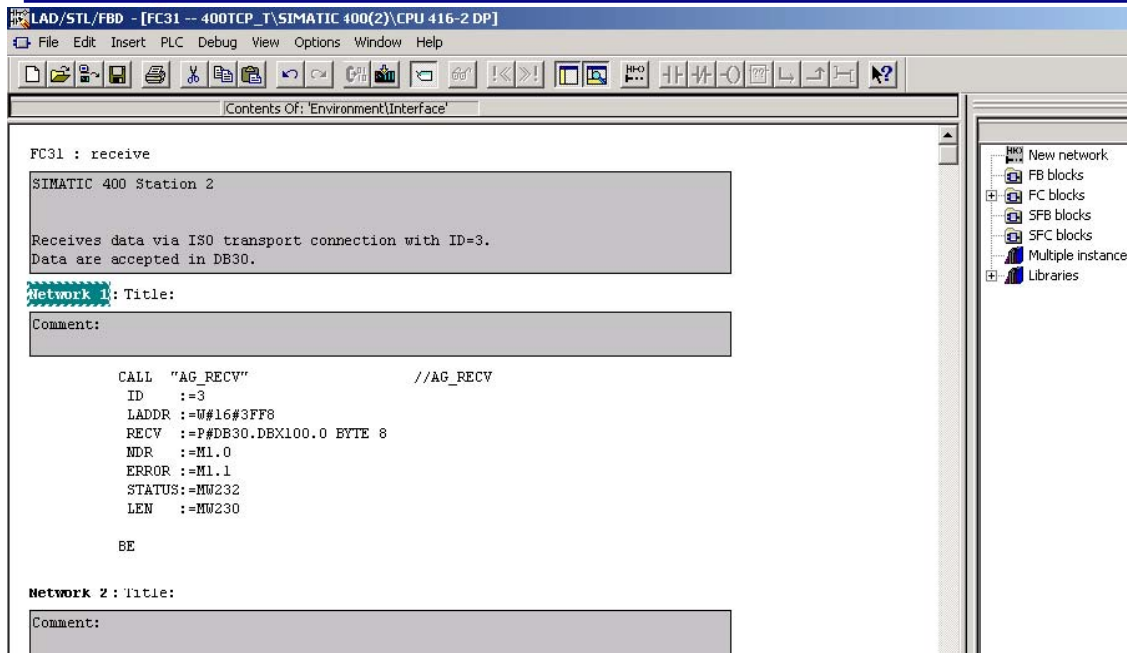
For FC5, we need to define:

- ACT: set it to one to trigger FC  
 ID: connection ID number which is set in Netpro  
 LADDR: CP module start address which is set in hardware configuration, also available in Netpro. The address is in HEX mode, for example 3FF8<sub>H</sub>  
 SEND: set the transfer data address and buffer length  
       keep the format for example P#DB31.DBX100.0 BYTE 8  
 LEN: numbers of bytes to be send from the transport data area with this job  
 DONE: bit signal for executed status

For error evaluate we can check the connector Error and Status. For the status code we can get detail information in the FC5 description documentation.



For FC6, we can do it in the same way.



Because we use DB30 and DB31 in the program FC30 and FC 31, we must insert these two data block and download it to the CPU.

#### 4. Physical connection

TDC side: CP51M1 supply RJ45 interface

S7 side: CP443-1 supply RJ45 interface

Between the double sides we need a Switch to connect.

## 附录一 推荐网址

### AS

西门子（中国）有限公司

自动化与驱动集团 客户服务与支持中心

网站首页: <http://www.ad.siemens.com.cn/Service/>

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AS常问问题: <http://support.automation.siemens.com/CN/view/zh/10805055/133000>

AS更新信息: <http://support.automation.siemens.com/CN/view/zh/10805055/133400>

“找答案” AS版区: <http://www.ad.siemens.com.cn/service/answer/category.asp?cid=1027>

### NET

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Net常问问题: <http://support.automation.siemens.com/CN/view/zh/10805868/133000>

Net更新信息: <http://support.automation.siemens.com/CN/view/zh/10805868/133400>

“找答案” Net版区:

<http://www.ad.siemens.com.cn/service/answer/category.asp?cid=1031>