SIEMENS

常问问题 • 10/2014

SIMOTION 和 S7-1500 的以太网 TCP 通信

TCP、SIMOTION、S7-1500

http://support.automation.siemens.com/CN/view/zh/103622917

目录

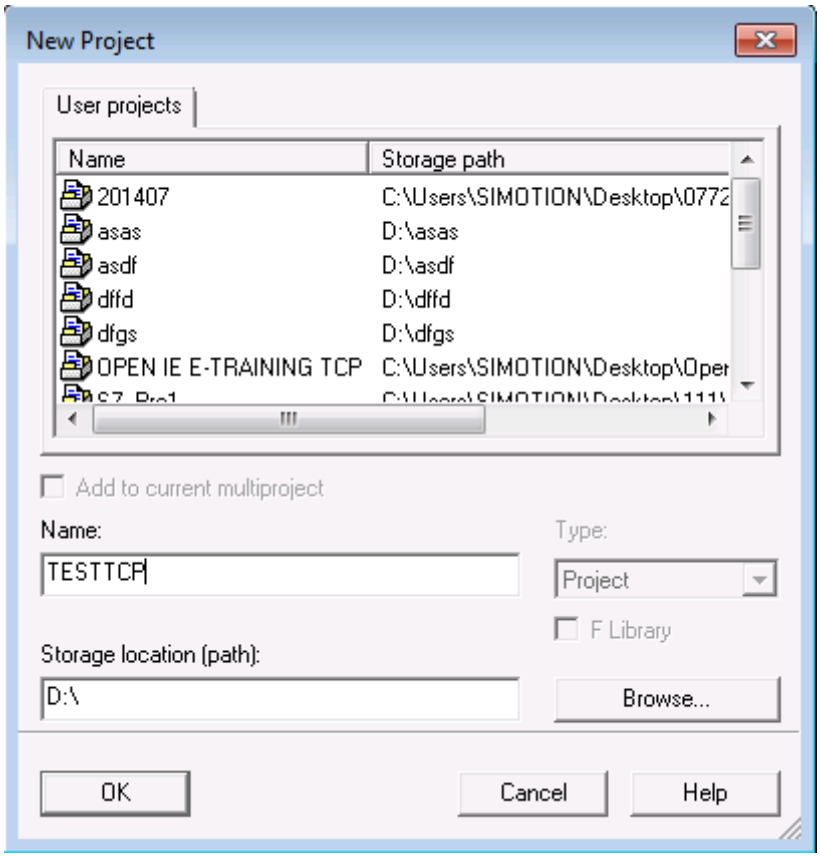
1 概述

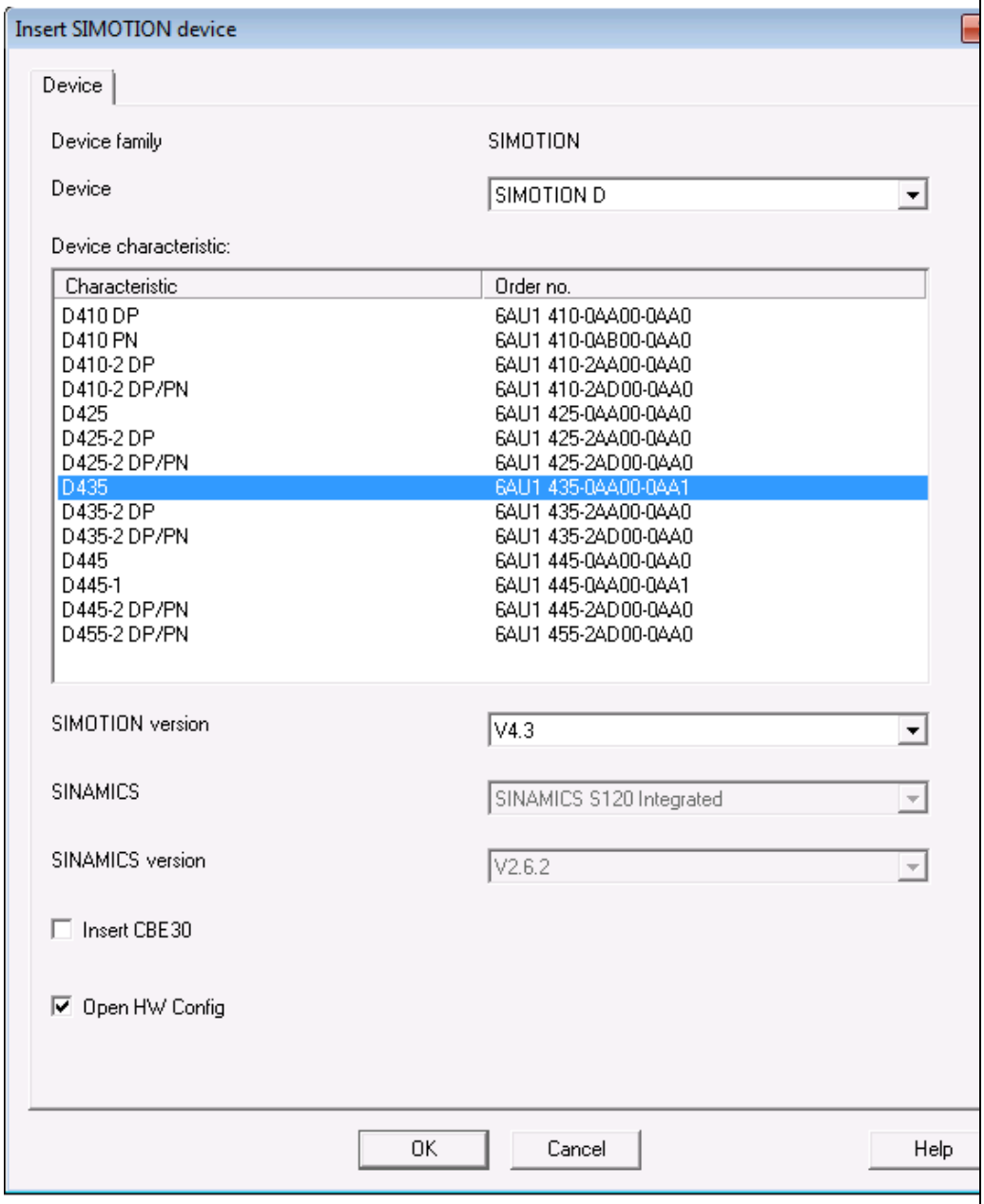
在开放的、不同种类的西门子通讯系统内，工业以太网是用于管理和单元级的网络。从物理结构上说，工业以太网是一个使用双绞线的电气网络，或者是一个使用光纤电缆的光学网络。在工厂或者设备间可以使用 TCP 通信进行非实时的数据交换，本文以 S7-1500 和 SIMOTION 为例进行 TCP 通信的介绍和配置的步骤说明。

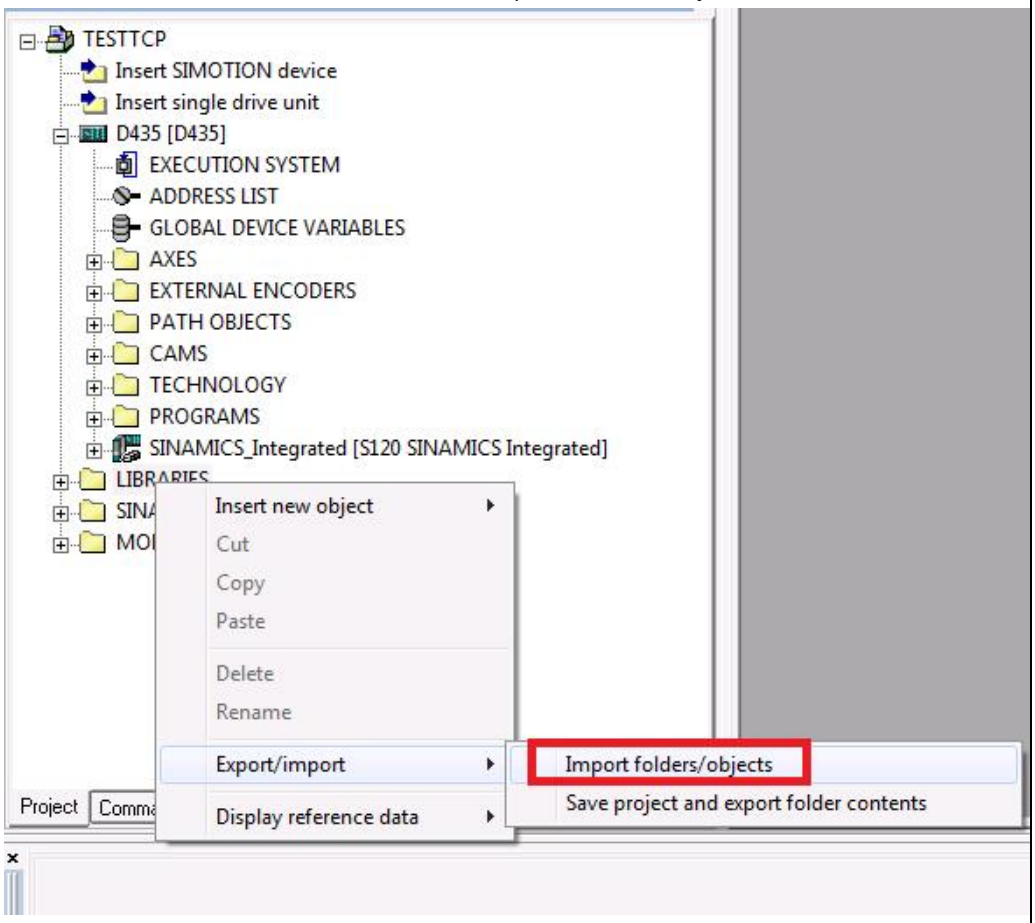
2 配置步骤

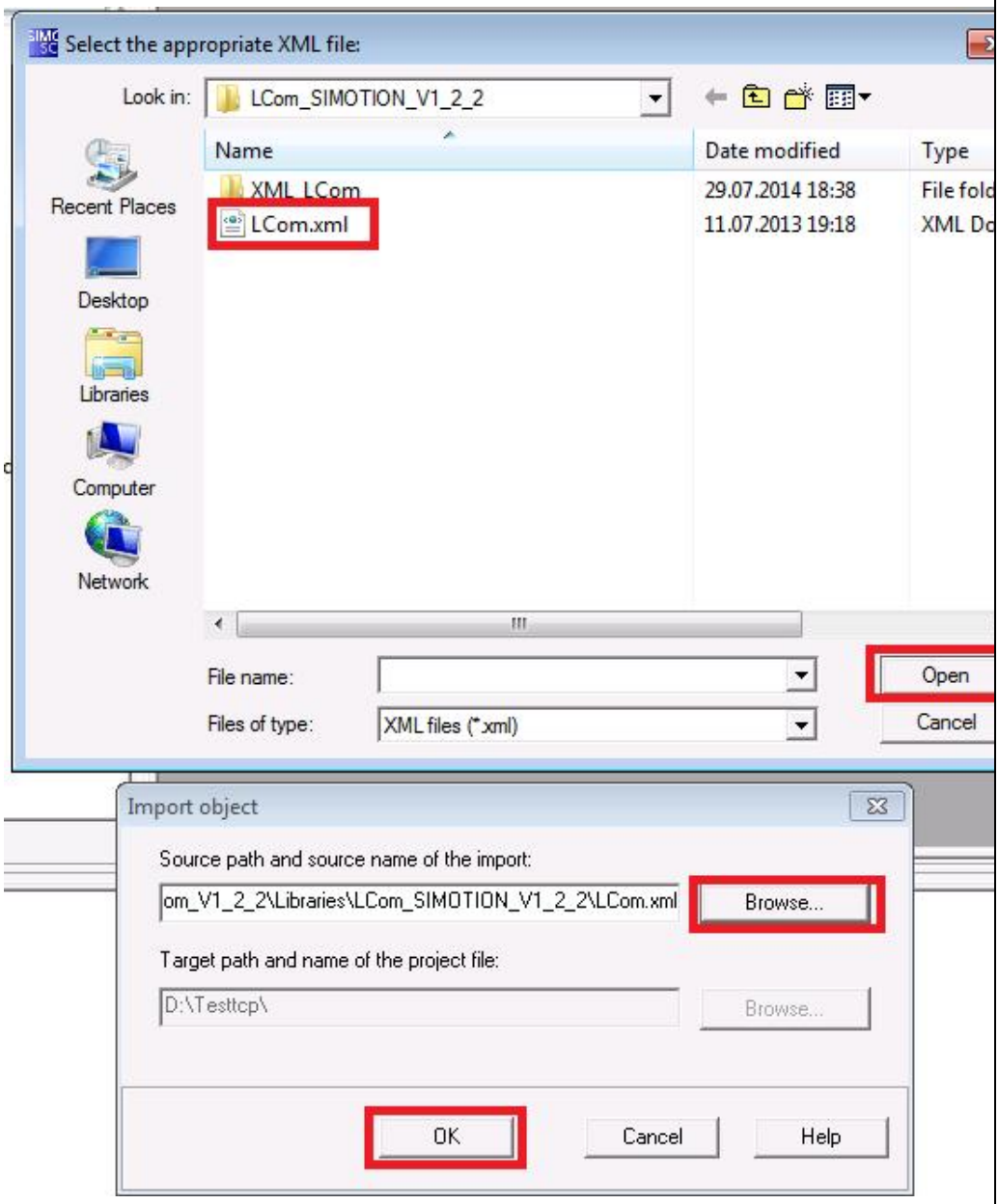
软件安装过程如表 1 所示

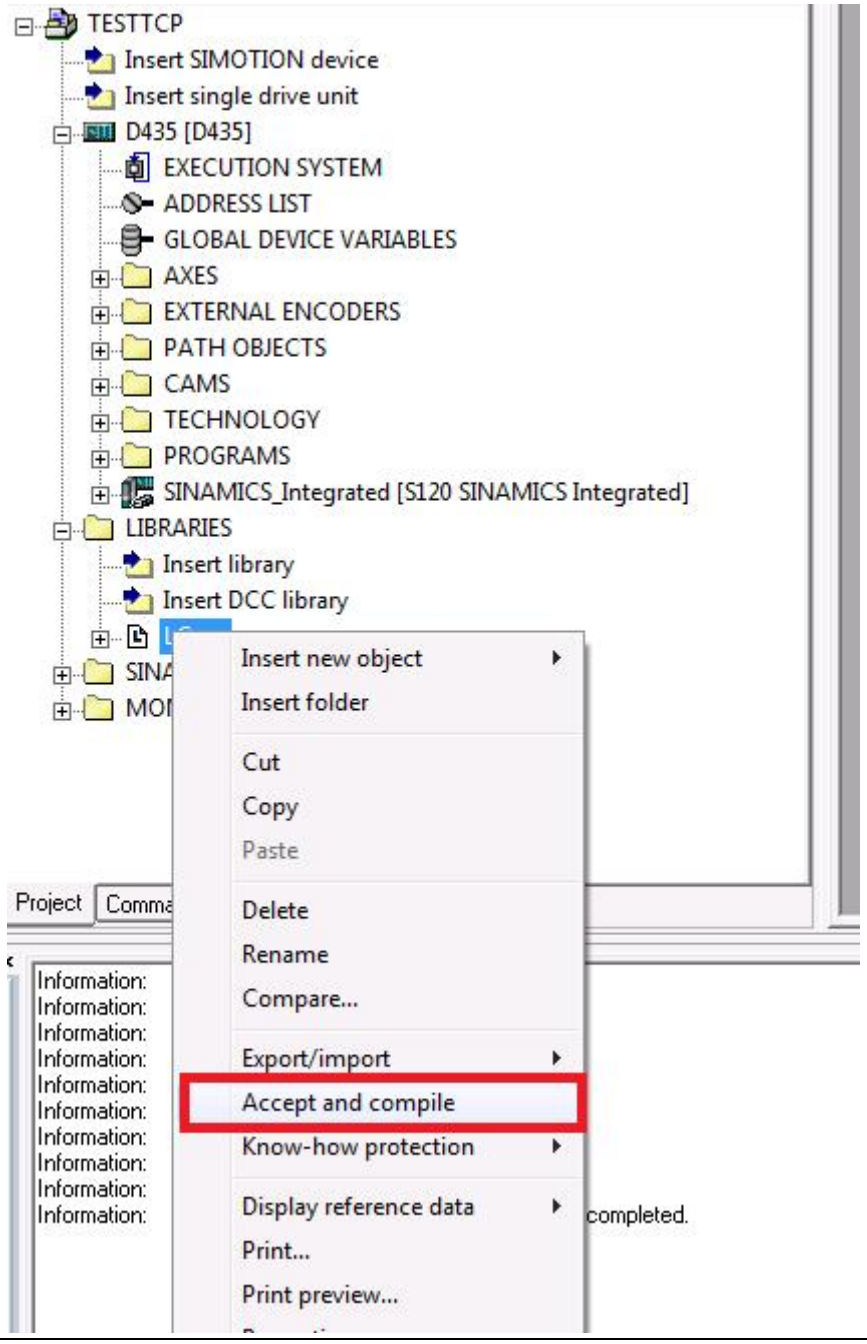
表 1.

<table>
<tr><th>序号</th><th>说明</th></tr>
<tr><td></td><td>通信说明如下：
<table>
<tr><td>SIMOTION</td><td>S7-1500</td><td>说明</td></tr>
<tr><td>192.168.214.1</td><td>192.168.214.10</td><td>各自的 IP 地址，在同一网段并且不冲突</td></tr>
<tr><td>2000</td><td>2200</td><td>端口号</td></tr>
<tr><td>客户机</td><td>服务器</td><td>TCP 通信时，需要设置一个为客户机一个为服务器</td></tr>
<tr><td>10bytes 收发</td><td>10bytes 收发</td><td>数据长度</td></tr>
</table></td></tr>
<tr><td>2.</td><td>首先建立一个 SIMOTION 的项目：
 
</td></tr>
</table>

3.	插入一个 SIMOTION D435:  弹出硬件组态界面后保存编译并关闭。

4.	导入通信使用的 LCOM 库（http://support.automation.siemens.com/WW/view/cn/48955385），如下图所示，在 LIBRARIES 上点击右键，选择 Import folders/objects： 

5.	浏览并且导入 LCOM 库： 

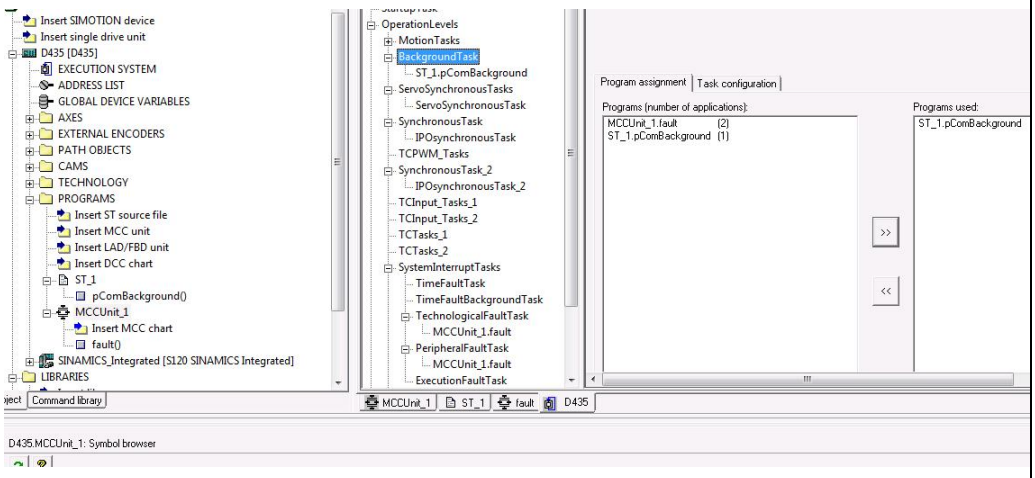
6.	点击右键并且选择接受并且编译 

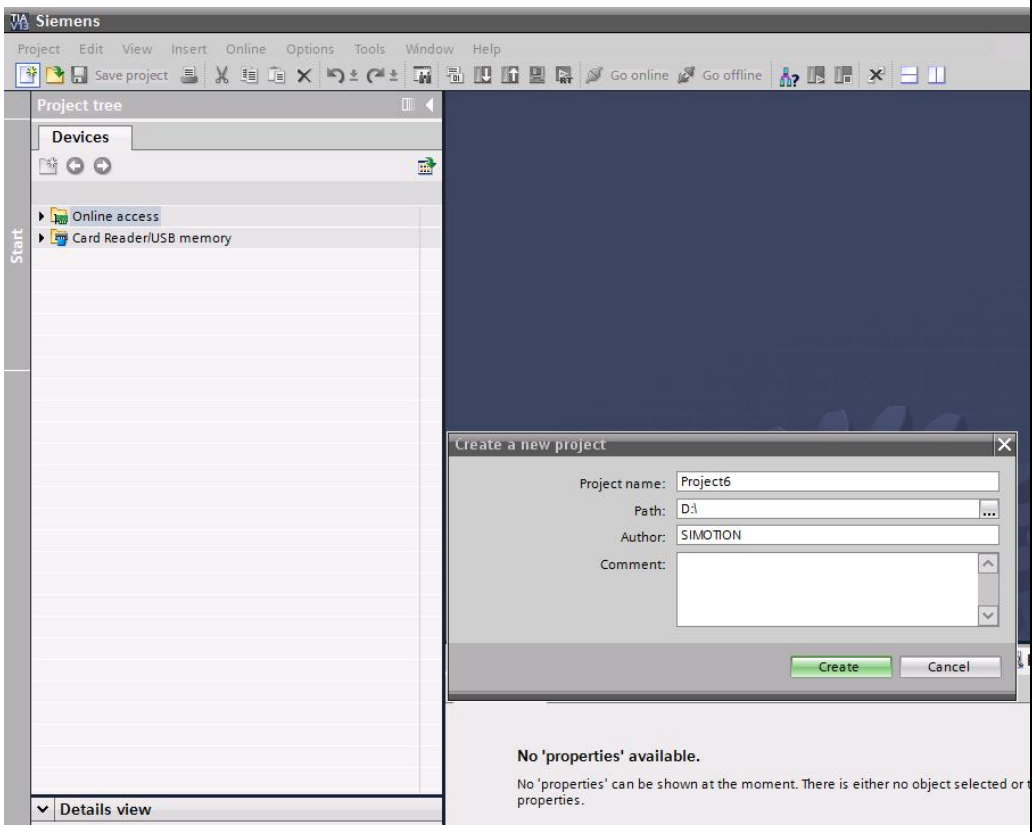
7. 编写如下程序：

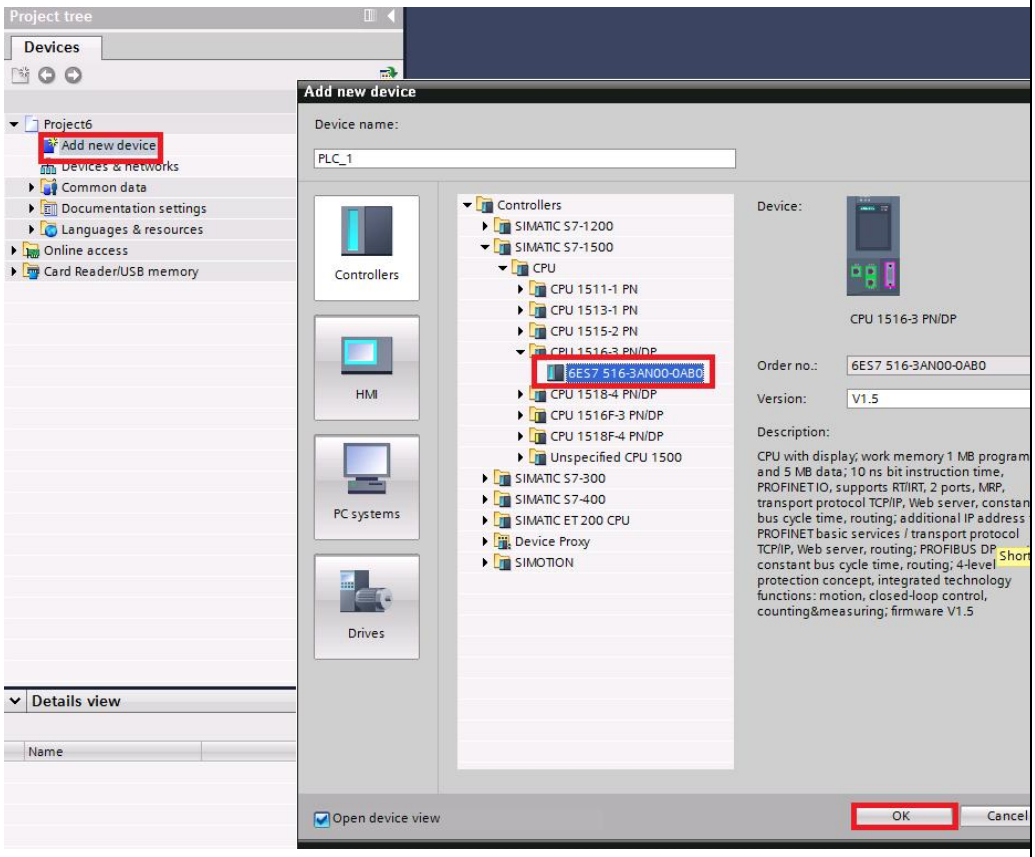
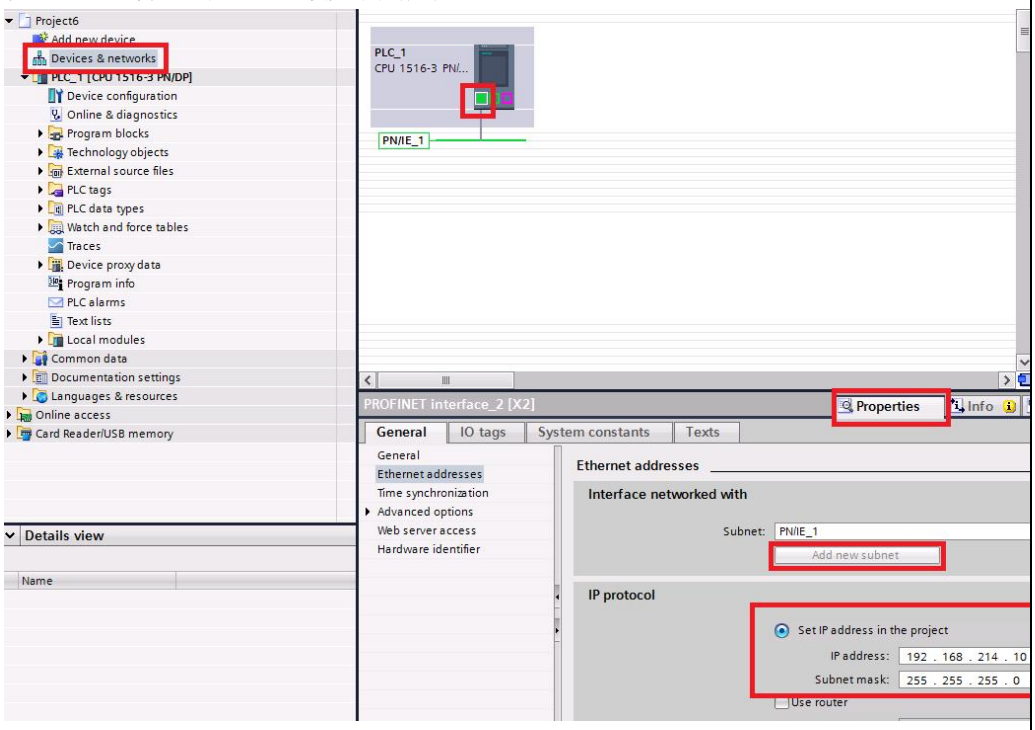
```
INTERFACE
//------------ import ------------------------------------------------------
    USELIB LCom;
//------------ global device variables -------------------------------------
    VAR_GLOBAL
        gab8SendBuffer      : ARRAY[0..LCOM_SEND_DATA_LENGTH-1] OF BYTE;
        gab8ReceiveBuffer   : ARRAY[0..LCOM_RECEIVED_DATA_LENGTH-1] OF BYTE;
        FBCom               : fbLComMachineCom;   //instance of FB
    END_VAR
//------------ export ------------------------------------------------------
    PROGRAM pComBackground;
//--------------------------------------------------------------------------
END_INTERFACE
IMPLEMENTATION
//--------------------------------------------------------------------------
PROGRAM pComBackground
    VAR
        sComParameter       : sLComParameterType; //parameter for FB
        boFirstCycle        : BOOL := TRUE;
        boEnable            : BOOL := TRUE; //run direct
        boCommunicate       : BOOL := TRUE; //run direct
        u16SendDataLength   : UINT :=  10;
        boConnected         : BOOL;
        boError             : BOOL;
        b32ErrorId          : DWORD;
        boDataReceived      : BOOL;
        boSenderActive      : BOOL;
        boReceiverActive    : BOOL;
        u16ReceivedLength   : UINT;
    END_VAR
    IF boFirstCycle THEN //Initialization in first cycle
        //connection configuration
        sComParameter.sCfgConnection.boWithLComProtocol     := FALSE;
        sComParameter.sCfgConnection.boAcceptUnknownPartner := TRUE;
        sComParameter.sCfgConnection.u16ComService          :=    1; //1 = TCP
        sComParameter.sCfgConnection.boIsTcpClient          := TRUE; //is client
        sComParameter.sCfgConnection.u16LocalPort           := 2000;
        sComParameter.sCfgConnection.au8RemoteAddress[0]    :=  192;
        sComParameter.sCfgConnection.au8RemoteAddress[1]    :=  168;
        sComParameter.sCfgConnection.au8RemoteAddress[2]    :=  214;
        sComParameter.sCfgConnection.au8RemoteAddress[3]    :=    10 ;
        sComParameter.sCfgConnection.u16RemotePort          := 2200;
        sComParameter.sCfgConnection.u16LifeSignCycle       :=  300; //ms
        //sender parameter
        sComParameter.sCfgSender.u8ComMode          :=   1; //2: Mode on_change
        sComParameter.sCfgSender.u16CycleTime       := 1000; //ms
        sComParameter.sCfgSender.u16AckTimeout      := 500; //ms
        sComParameter.sCfgSender.u8SlidingWindow    :=   1;
        //receiver parameter
        sComParameter.sCfgReceiver.u8ComMode        := 1;
        sComParameter.sCfgReceiver.u16CycleTime     := 1000;
        sComParameter.sCfgReceiver.u16AckTimeout    := 500;
        sComParameter.sCfgReceiver.u8SlidingWindow := 1;
        //time synchronization parameter
        sComParameter.sCfgTimeSync.boUseReceivedTimeStamps := FALSE;
        sComParameter.sCfgTimeSync.u8SendModeTimeSync      := 0;
        sComParameter.sCfgTimeSync.u16TimeSyncCycleTime    := 0;
        sComParameter.sCfgTimeSync.todTimeSyncAtTime       := TOD#00:00:00.0;
        //reset after first cycle
        boFirstCycle := FALSE;
    ELSE
```

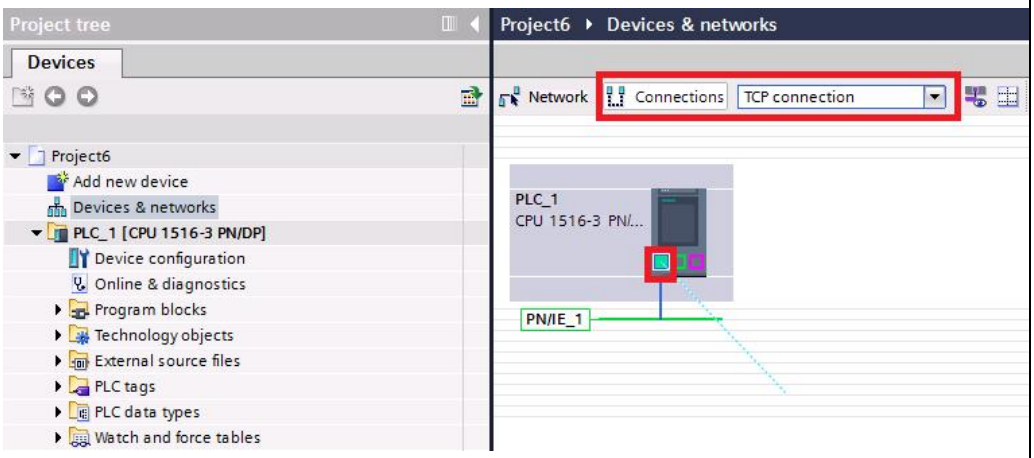
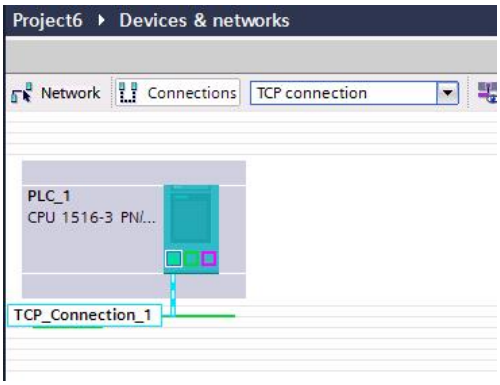
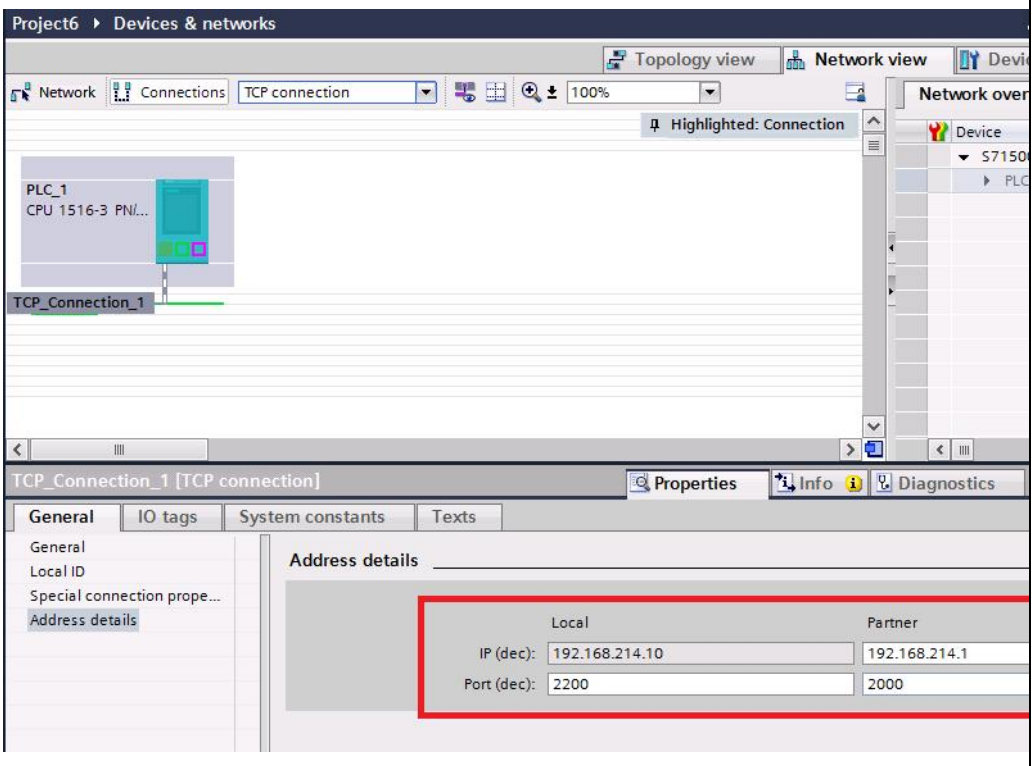
```
        //call communication function block
        FBCom(
             enable             := boEnable
            ,communicate        := boCommunicate
            ,sendDataLength     := u16SendDataLength
            ,sendData           := gab8SendBuffer
            ,receivedData       := gab8ReceiveBuffer
            ,parameter          := sComParameter
            ,connected          => boConnected
            ,dataReceived       => boDataReceived
            ,error              => boError
            ,errorId            => b32ErrorId
            ,senderActive       => boSenderActive
            ,receiverActive     => boReceiverActive
            ,receivedDataLength => u16ReceivedLength
            );
    END_IF;
END_PROGRAM
END_IMPLEMENTATION
```

8. 分配程序到执行组，并且下载程序，运行 SIMOTION：



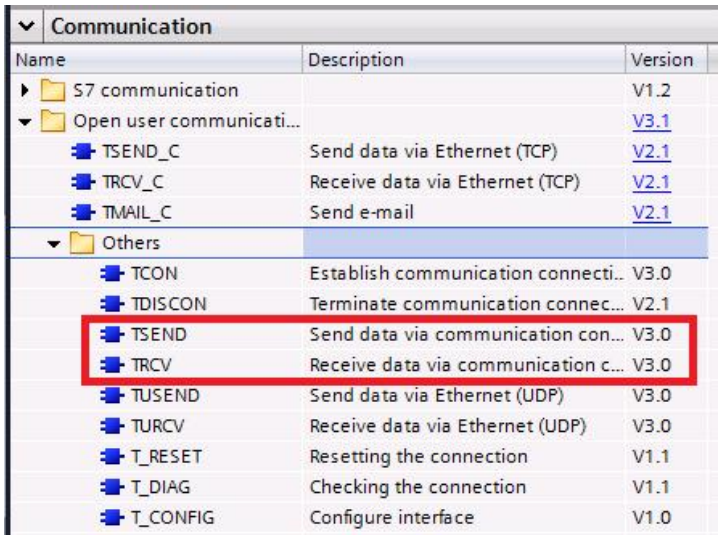
9.	打开博途软件，创建一个新项目： 

10.	插入一个 PLC ，本例使用 1516CPU： 
11.	设置 IP 地址并且创建网络连接如下图所示： 

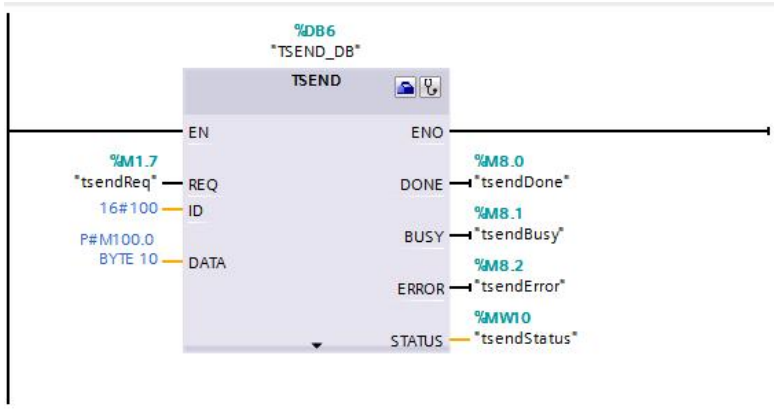
12.	创建 TCP 通信连接，选择 "Connections"，并且选择 TCP connection，需要注意，在建立连接的时候首先鼠标左键点击端口，显示出一条虚线后，再点击回此端口，即可建立连接：  创建好的连接如下图所示： 
13.	点击此连接的属性，并且填写连接的信息，如下图所示： 

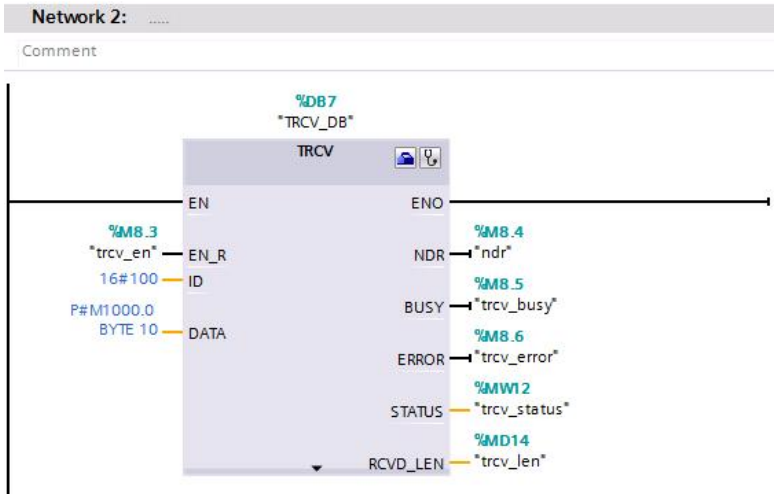
14. 编写程序如下图所示：

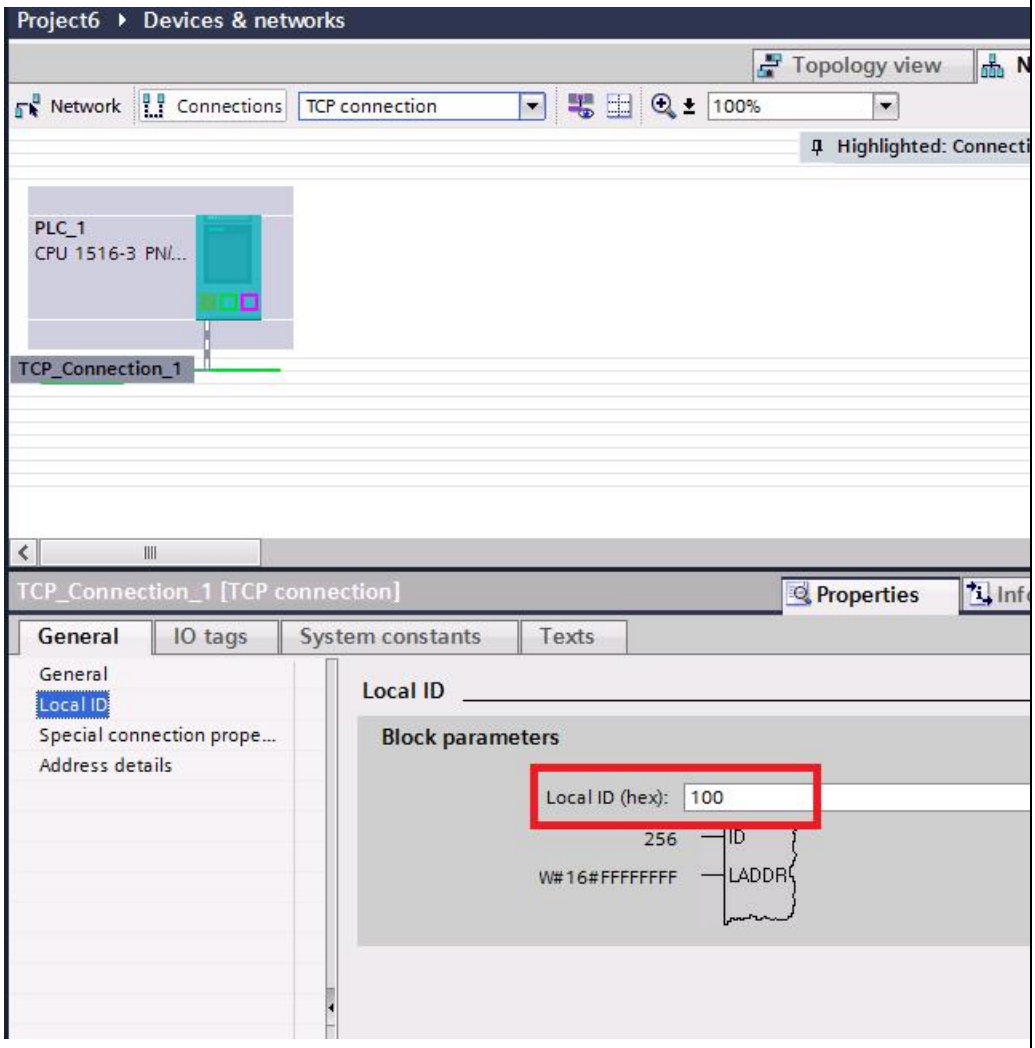
使用如下指令：



在 OB1 中编写如下程序：





15.	关于 ID 参数的说明，此参数可以在连接的 Local ID 属性中获取： 

16.

从 SIMOTION 发送到 PLC：

D435.ST_1: Symbol browser

Control

	Name	Data type	Display format	Initial value	Status value		Control val
	All	All	All	All		All	All
1	gab8SendBuffer	'ARRAY [0..4095] OF BYTE'					
2	gab8SendBuffer[0]	BYTE	HEX	16#00	16#77	☑	16
3	gab8SendBuffer[1]	BYTE	HEX	16#00	16#77	☑	16
4	gab8SendBuffer[2]	BYTE	HEX	16#00	16#00	☐	
5	gab8SendBuffer[3]	BYTE	HEX	16#00	16#00	☐	

PLC 的 watch table：

	Name	Address	Display format	Monitor value	Modify value
1	"tsendReq"	%M1.7	Bool	TRUE	TRUE
2	"tsendDone"	%M8.0	Bool	FALSE	
3	"tsendBusy"	%M8.1	Bool	FALSE	
4	"tsendError"	%M8.2	Bool	FALSE	
5	"tsendStatus"	%MW10	Hex	16#7000	
6	"trcv_en"	%M8.3	Bool	TRUE	TRUE
7	"ndr"	%M8.4	Bool	FALSE	
8	"trcv_busy"	%M8.5	Bool	TRUE	
9	"trcv_error"	%M8.6	Bool	FALSE	
10	"trcv_status"	%MW12	Hex	16#7002	
11	"trcv_len"	%MD14	DEC	0	
12		%MW100	Hex	16#1234	16#1234
13		%MW102	Hex	16#5678	16#5678
14		%MW1000	Hex	16#7777	
15		<Add new>			

17.

从 PLC 到 SIMOTION：

Project5 ▸ PLC_1 [CPU 1516-3 PN/DP] ▸ Watch and force tables ▸ Watch table_1

	Name	Address	Display format	Monitor value	Modify value
1	"tsendReq"	%M1.7	Bool	TRUE	TRUE
2	"tsendDone"	%M8.0	Bool	FALSE	
3	"tsendBusy"	%M8.1	Bool	FALSE	
4	"tsendError"	%M8.2	Bool	FALSE	
5	"tsendStatus"	%MW10	Hex	16#7000	
6	"trcv_en"	%M8.3	Bool	TRUE	TRUE
7	"ndr"	%M8.4	Bool	FALSE	
8	"trcv_busy"	%M8.5	Bool	TRUE	
9	"trcv_error"	%M8.6	Bool	FALSE	
10	"trcv_status"	%MW12	Hex	16#7002	
11	"trcv_len"	%MD14	DEC	0	
12		%MW100	Hex	16#1234	16#1234
13		%MW102	Hex	16#5678	16#5678
14		%MW1000	Hex	16#7777	
15		<Add new>			

SIMOTION 观察到的接收数据：

	Name	Data type	Display format	Initial value	Status value		Control val
	All	All	All	All		All	All
1	gab8SendBuffer	'ARRAY [0..4095] OF BYTE'					
2	gab8ReceiveBuffer	'ARRAY [0..4095] OF BYTE'					
3	gab8ReceiveBuffer[0]	BYTE	HEX	16#00	16#12		
4	gab8ReceiveBuffer[1]	BYTE	HEX	16#00	16#34		
5	gab8ReceiveBuffer[2]	BYTE	HEX	16#00	16#56		
6	gab8ReceiveBuffer[3]	BYTE	HEX	16#00	16#78		
7	gab8ReceiveBuffer[4]	BYTE	HEX	16#00	16#00		