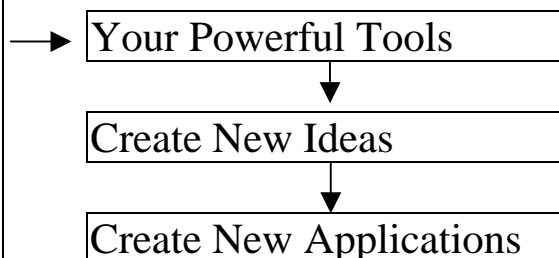


8000E Series

8000E Series Hardware User's Manual

8000 Series New Features

1. Virtual COM Technology
2. Ethernet I/O Technology
3. Web-server Technology
4. MiniOS7 & Xserver Inside
5. I/O Expansion Bus Inside
6. Time to market & Cost Effective Solution



Warranty

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1. Introduction

The 8430/8830/8431/8831 are designed to be used as an embedded controller. The comparison table of 8430/8830/8431/8831 is given as follows:

	8430/8830	8431/8831
RAM	256K	512K
ROM	256K	512K
COM port	0/1/3	0/1/3/4
RTC & NVRAM	No	Yes
Hardware Serial Number	No	Yes
Default shipping	Upgrade 8410/8810	Xserver inside to act as an embedded server
Default firmware	8KE10.exe	Demo36.exe
Download User's program	Yes	Yes
Use Xserver	Yes	Yes
Upgrade 8410/8810 (VxComm technology)	Yes	Yes
Product position	Cost effective solution	High performance solution

Refer below files to get more information:

1. 8000\843x883x\Document\[Readme.htm](#)
2. 8000\843x883x\Document\[8000E_Quick_Start.pdf](#)
3. 8000\843x883x\Document\[Introduction.pdf](#)
4. 8000\843x883x\Document\[8000Eh.pdf](#)
5. 8000\843x883x\Tcp\Vxcomm\Doc\Big5 or Eng or Gb2312\[Vxcomm.htm](#)
6. 8000\843x883x\Tcp\Xserver\[Xserver.htm](#)
7. 8000\843x883x\Tcp\Xserver\[Function.htm](#)

1.1 Why Need VxComm Technology

There are many RS-232 devices in factories. Linking all these RS-232 devices to central computer is important in industry automation. There are many different approaches to link these devices together. Some important approaches are given as follows:

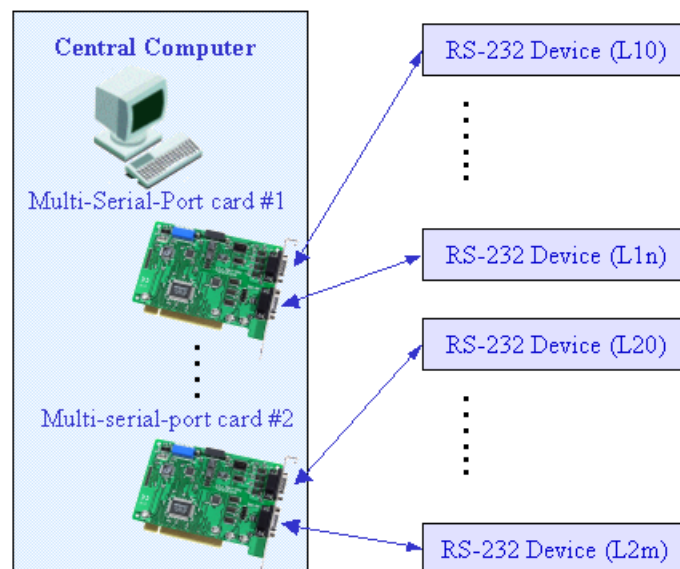
Old approach: Using multi-serial-ports card

Improved approach: Using RS-485 networking (RS-485 to RS-232 converter)

New approach: Using Ethernet networking (Ethernet to RS-232 converter)

1.1.1. Using Multi-serial-ports Card

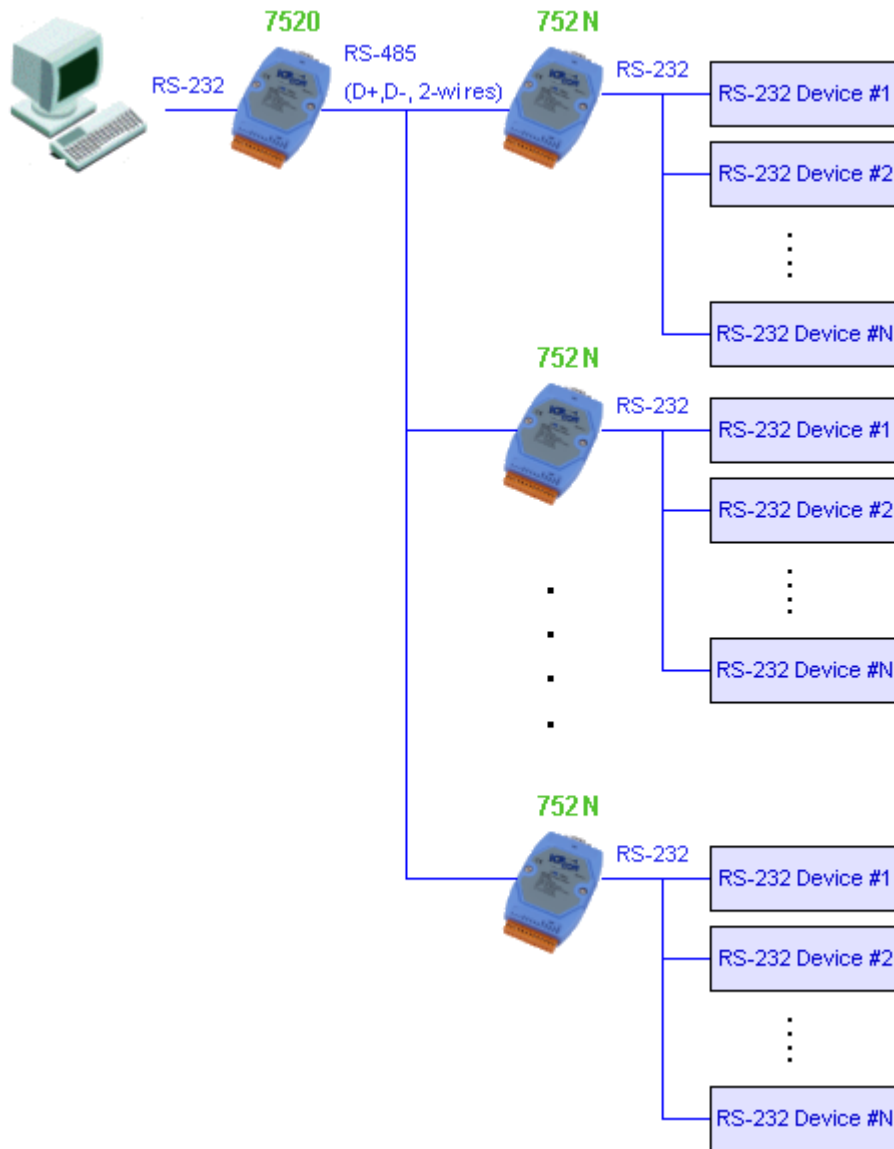
These multi-serial-ports cards can be installed into the central computer & linking to these RS-232 devices as follows:



If these RS-232 devices are very close to the central computer, this approach will work even the wiring is complicated. Unfortunately, these RS-232 devices are always distributed in the factory. So the connection wires, L10...L1n & L20...L2m, are very expensive and hard to maintain.

1.1.2. Using RS-485 Network

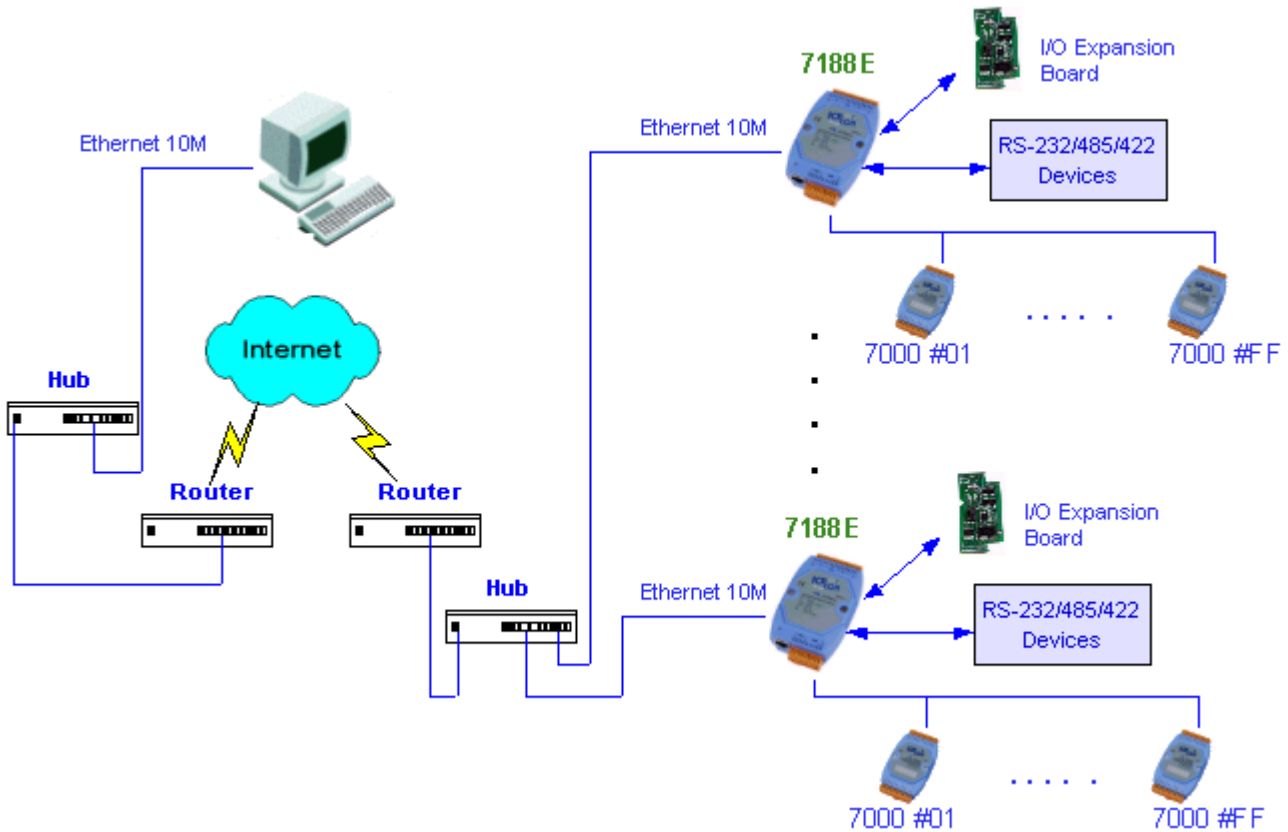
The 752N family is designed as RS-232 to RS-485 converter. So they can be used to link these RS-232 devices to central computer as follows:



Even these RS-232 devices are very distributed in the factory, the RS-485 network is simple and easy to maintain. So this is a very successful approach. Refer to “7188XA/B/C & 7521/2/3 Series User’s Manual” for more information about 752N family.

1.1.3. Using Ethernet Network

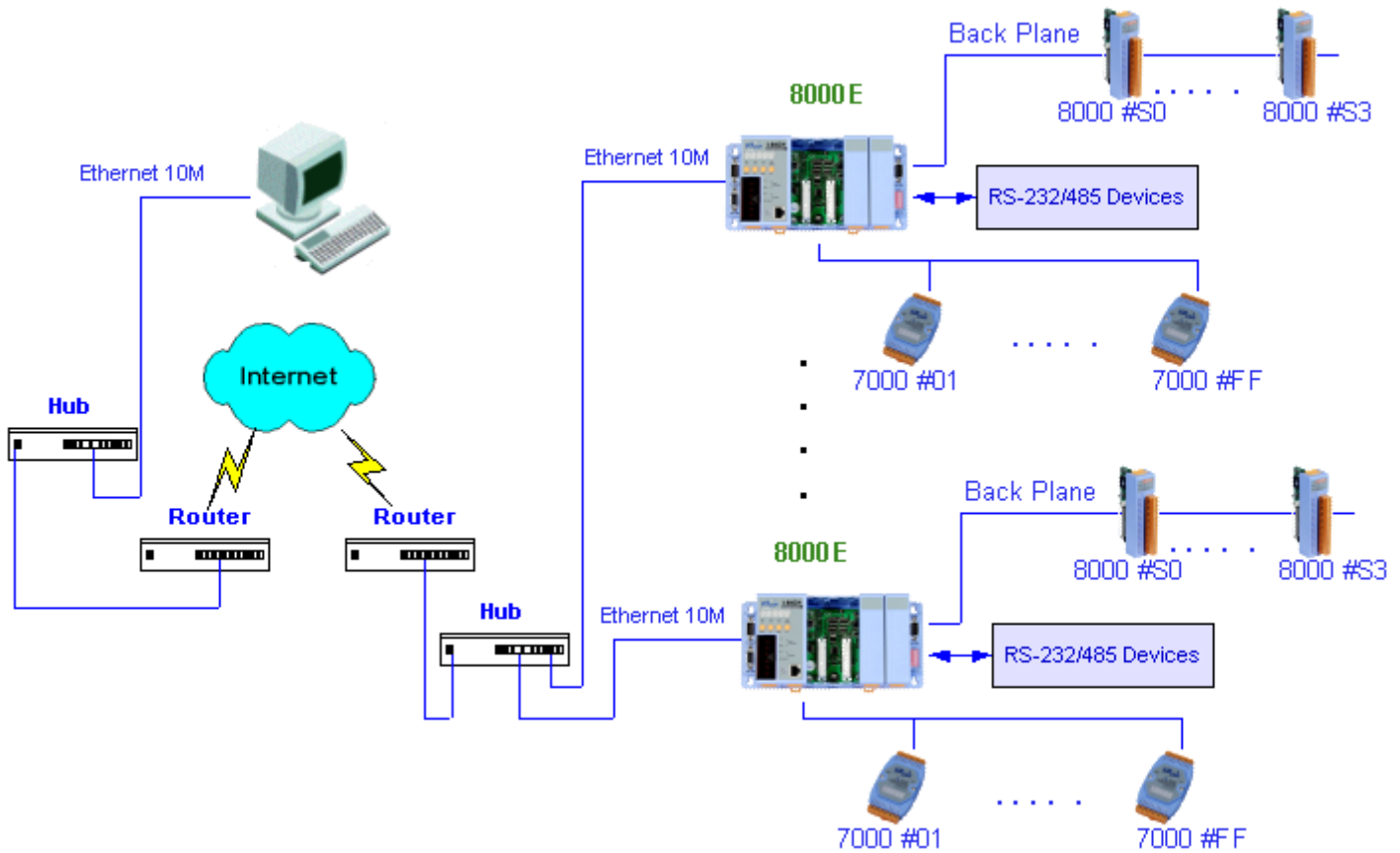
The 7188E family is designed as a RS-232 to Ethernet converter. So it follows that they can be used to link these RS-232 devices to the central computer as follows:



Compared to the RS-485 network, these Ethernet network hubs are already in existence for system network. Therefore, the RS-232 devices can find the closest hub and link to the central computer with the help of the 7188E family. The Ethernet network is extremely popular and already existing for most applications, hence, this approach is a very successful. Refer to “7188E Series Software User’s Manual” for more information about the 7188E family.

When linking these devices together, users must write a program to read/write to the 7188E family. In general, it is more difficult to write a TCP/IP program than a COM 1/2 program. **Therefore, the VxComm technology is developed to virtualize COM-ports of the 7188E to become COM 3/4/5.../256 of the central computer.** Then, users can write a program using COM port interface to link these remote RS-232 devices need not to concern themselves with any TCP/IP problem.

Of course, you can also apply the VxComm technology to the 8430/8830 and the 8431/8831. The most different between the 7188E series and 8000 series is there are many expansion I/O modules can plugged in 8000 series.

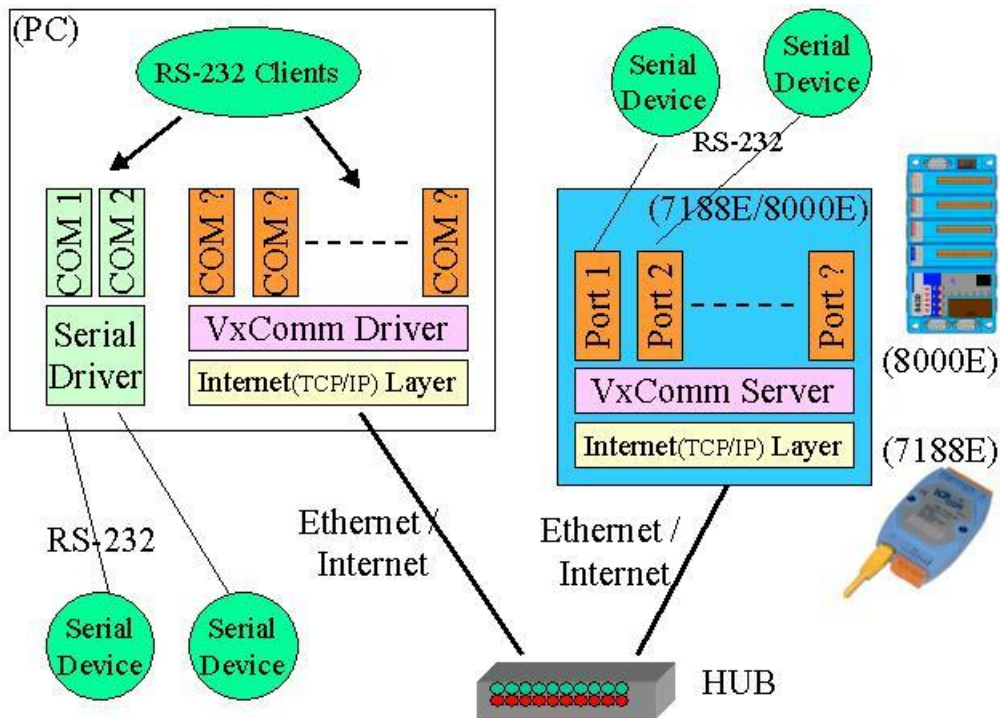


In some factories, there are old systems still running and in case. These old systems only support COM port applications. Therefore, the Vxcomm technology can be used to upgrade these old systems to support Ethernet network.

To recap, the VxComm technology is useful as follows:

- Provides a much easier interface for software programers.**
- Keeps the old systems going without program modification**

The block diagram of VxComm technology for 7188E/8000E family is given as follows:



The VxComm technology can be used to virtualize COM ports of the 7188E/8000E to become a COM port of PC. With the help of VxComm driver, users can access the remote COM port of the 7188E/8000E just as they would access the PC's COM 1/2.

Besides the COM ports of the 7188E/8000E, the MCU (Main Control Unit) of the 800E and all I/O expansion modules plugged in it can also be virtualized to become a COM port of the host PC. Thus, users can easily upgrade 8410/8810 to 8430/8830, and the program (running in the host PC) doesn't need any modification.

Note:

1. The 7188E family includes 7188E1/2/3/4/5/8/X/A.
2. The 8000E family now includes 8430/8830/8431/8831
3. The VxComm driver now supports Windows NT/2000/XP. We will provide the Windows 95/98 driver around Q3~Q4 of 2002.

1.2 Why Need Xserver Technology

Ethernet is so popular, so you can find Ethernet everywhere even in the factory. Industry automation is very important in modern factory. For industry applications, there are some important issues given as follows:

- Linking these RS232 devices to Ethernet network
- Reading analog/digital input signals from Ethernet network
- Sending analog/digital output control from Ethernet network
- Standing alone operation
- True distributed computation.
- Working stable and reliable as PLC
- Easy programming and maintenance

Xserver is designed to solve all above problems

The Xserver is designed to solve all the above problems:

- Linking RS232 devices to Ethernet network
The Xserver provides port 10000 for serial port configuration and port 10001 to 10008 for data sending/receiving. So its built-in function is to link RS-232 devices.

- Reading analog/digital input signals from Ethernet network

- Sending analog/digital output control to Ethernet network
The Xserver supports easy interface to the 7000 family. So its basic function is to link to 7000 family for analog/digital I/O. The Xserver also support an I/O expansion bus for user's special devices.

- Standing alone operation.

- True distributed computation.
The Xserver supports a loop-scan function and a timer trigger function to assist Xserver in data acquisition, data analysis and performing immediate, real-time control. The event-trigger function makes Xserver send a TCP/IP packet to

destination immediately when an emergency is occurred. In general, Xserver can make the 7188E/8000E work perfectly for both data acquisition and control application.

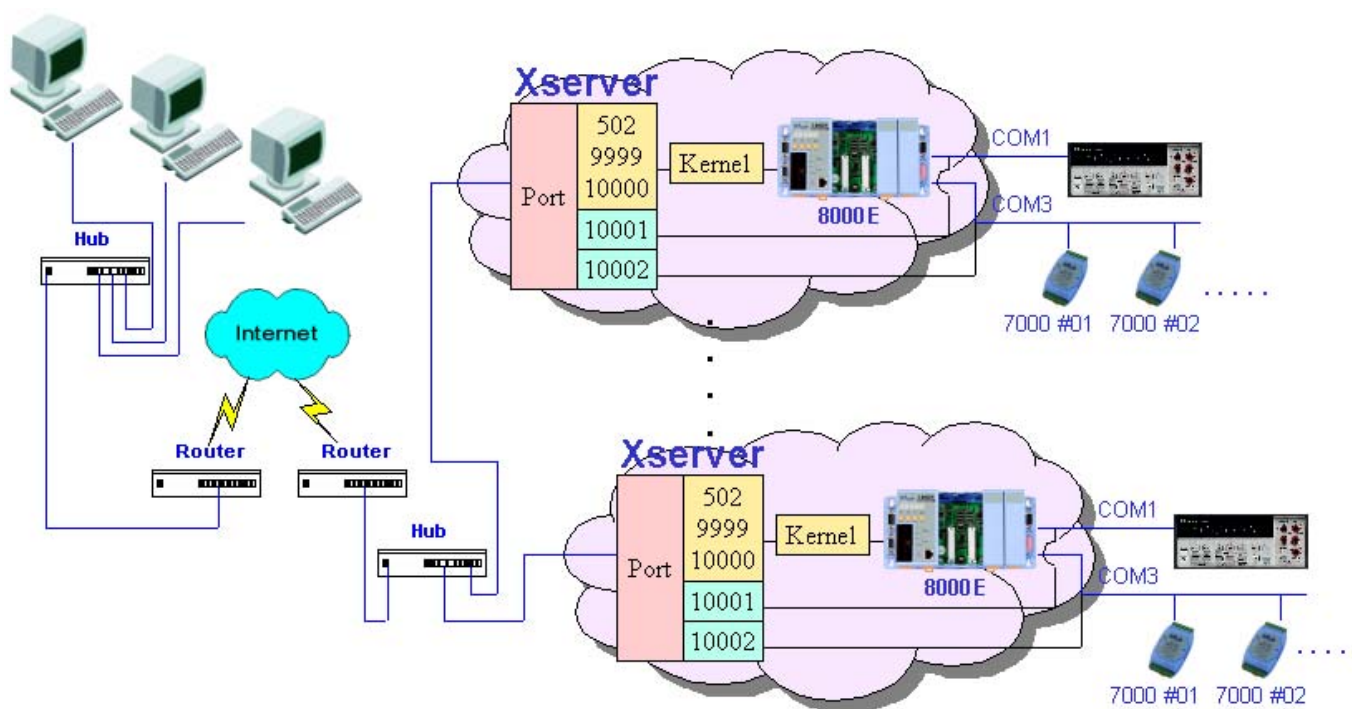
Working stably and reliably as PLC

The most important codes of Xserver are provided by ICPDAS. We have spent thousands of hours designing and testing this server. Consequently, this server is as stable as PLC without any user's additional programs. If users add their tailor made additions, the dual-watchdog mechanism and well-designed user interface will make this new Xserver stable enough for any purpose.

Easy programming and maintenance

The Xserver supports easy interfaces to our 7000 family. Its basic function is to link to the 7000 family for analog/digital I/O.

The block diagram of the Xserver for 7188E/8000E Family is given as follows:



The Xserver is a programmable server designed for the 7188E/8000E family. With the help of Xserver, the user can easily write a tailor-made program for

data acquisition and control within a stable system.

Note:

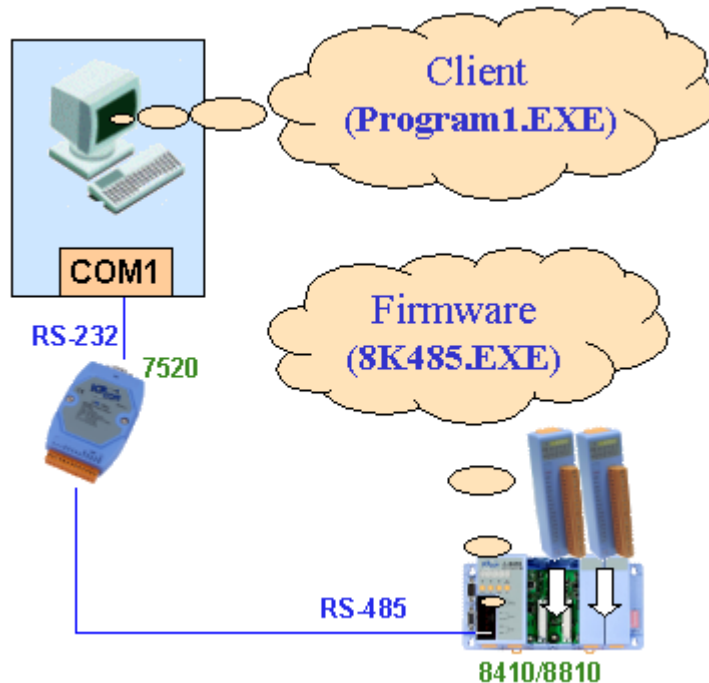
1. The 7188E family includes 7188E1/2/3/4/5/8/X/A.
2. The 8000E family now includes 8430/8830/8431/8831
3. **The Xserver supports standard TCP/IP protocol. So it can be used in any O.S. that supports TCP/IP protocol. Windows 95/98/NT/2000/XP/CE and Linux support TCP/IP protocol are all suitable environments for our Xserver.**

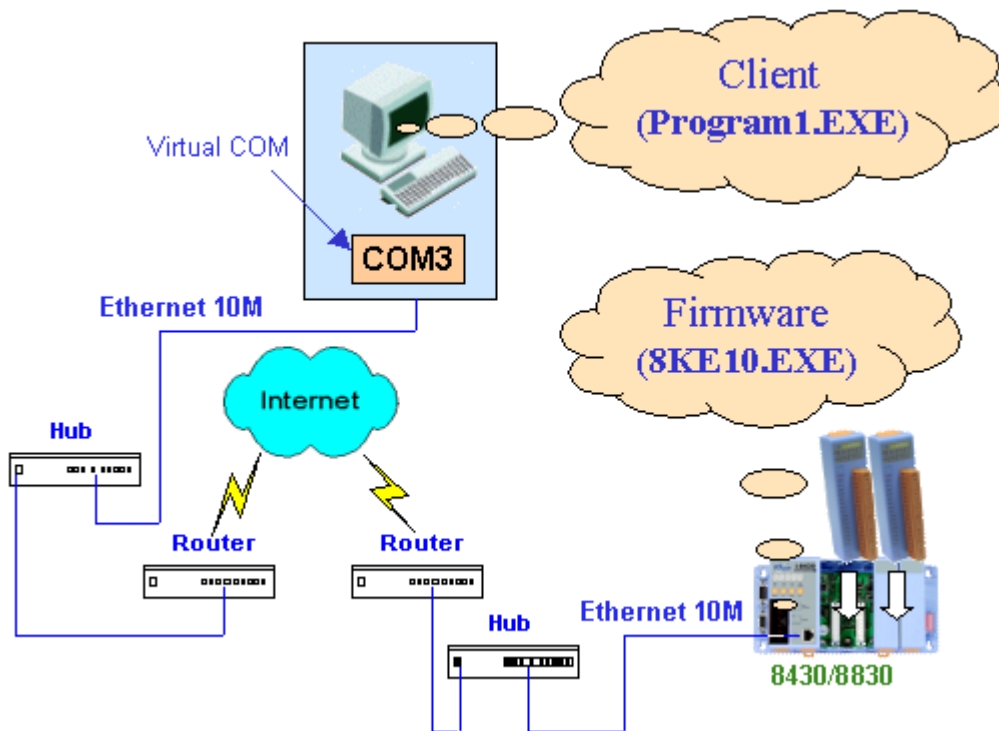
1.3 8430/8830 & 8410/8810

8430/8830 is very similar to 8410/8810. The major differences are:

	8410/8810	8430/8830
COM2 of MCU	RS-485	Ethernet 10M
Firmware	8K485.EXE	8KE10.EXE
Additional software on the host PC	None	Vxcomm Driver and Vxcomm Utility
COM port used by the client program running on the host PC	COM1/COM2 (Real COM port)	COM3~COM256 (Virtual COM port)

The two kind systems builded by 8410/8810 and 8430/8830 are shown as follows:





I think you already notice the client programs running on the host PCs are the same one (Program1.exe). How could the Program1.exe communicate with the hardwares (the 8000 mudules, the RS-232/485 devices, and the 7000 mudules) without any modification of the source codes, even the connection between the host PC and the hardwares is changed?

The key points are given as follows:

The virtual COM ports (COM3~COM256) created by VxComm Utility are compatible to the COM1/2 of PCs.

The **8KE10.EXE** provides same command sets as **8K485.EXE**

To upgrade 8410/8810 to 8430/8830, only 4 operation steps you must to do are:

Step 1: replace 8410/8810 to 8430/8830, and change the connection.

Step 2: install the Vxcomm Driver and Vxcomm Utility.

Step 3: use the Vxcomm Utility to virtulize the 8430/8830 to any COM port between COM3~COM256.

Step 4: Select the virtual COM port to communicate with hardwares when you run the client program.

Note:

- If users download new programs, for example any Xserver demos, into 8430/8830, then the 8430/8830 can be used as an embedded controller. In this condition, 8430/8830 is **as same as** 8431/8831 except that the resources of 8430/8830 are more limited compared with 8431/8831. Refer to chapter-1 of this manual for comparison table.
- Please refer to “8000E software user’s manual” for more information about usage of the Vxcomm technology.

1.4 Default Shipping of 8430/8830

The network interface of 8410/8810 is RS-485. The default shipping of 8410/8810 is equipped with a firmware, 8K485.EXE, to act as a device very similar to our famous 7000 family. So all software drivers designed for the 7000 family can be also used for 8410/8810.

The default shipping of 8430/8830 is equipped with a firmware, **8KE10.EXE**. The 8K10.EXE is well designed to provide all equivalent functions of the 8K485.EXE. With the help of the VxComm Driver, the 8430/8830 will be virtualized to one new COM port on the host-PC. That is, the 8430/8830 can be virtualized to 8410/8810. Then all old programs designed for 8410/8810 can be applied to 8430/8830 immediately without any modification. **So we can upgrade our DAQ system form RS-485 network to Ethernet 10M immediately & without change any ready software.**

The default shipping of 8430/8830 is equipped with a firmware as follows:

AUTOEXEC.BAT 8KE10.EXE

The content of AUTOEXEC.BAT is given as follows:

8KE10 /st300



The option “/st” of the command line is one of dual-watchdog mechanism. “/st300” means the client program must send some commands to this server before 300 seconds is up. This mechanism will keep the 8000E family working continuously for years without human’s help. If the 300 seconds is up, this 8000E will **reset itself and start from the beginning of the 8KE10.EXE.**

1.5 Default Shipping of 8431/8831

The default shipping of 8431/8831 is equipped with a Xserver as follows:

AUTOEXEC.BAT Demo36.EXE
--

The content of AUTOEXEC.BAT is given as follows:

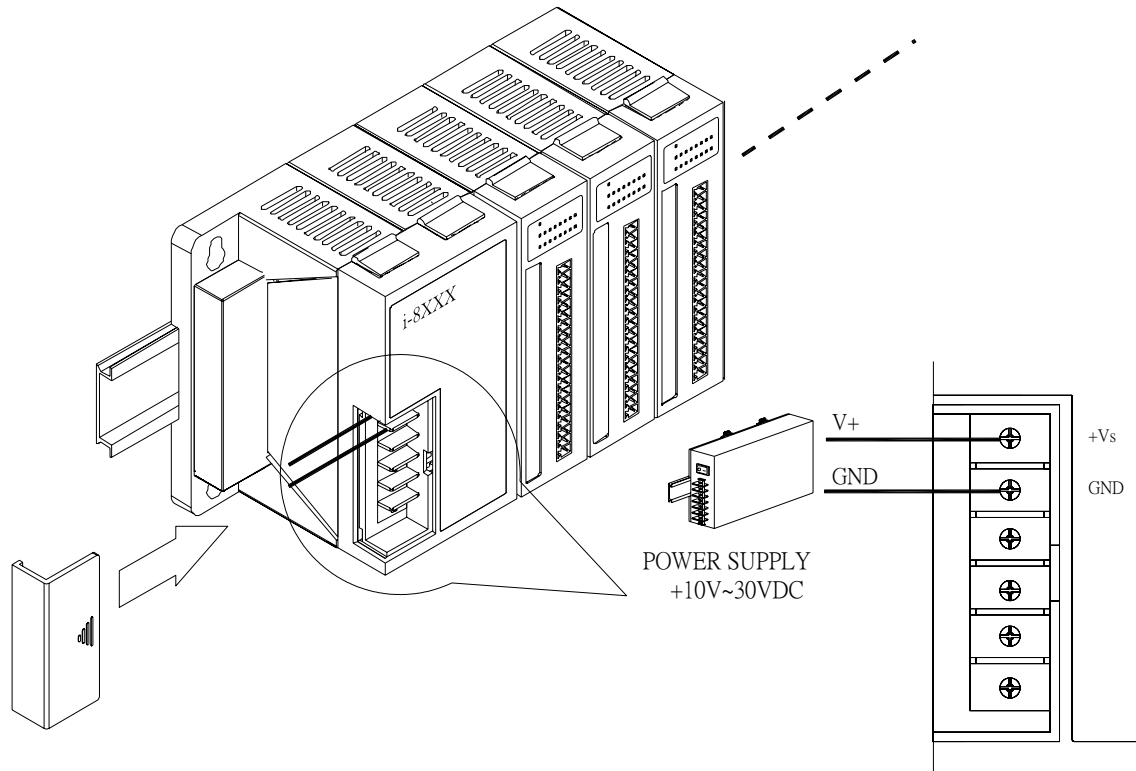
Demo36 /st300



The option “/st” of the command line is one of dual-watchdog mechanism. “/st300” means the client program must send some commands to this server before 300 seconds is up. This mechanism will keep the 8000E family working continuously for years without human’s help. If the 300 seconds is up, this 8000E will **reset itself and start from the beginning of the Xserver.**

2. Diagnostics of the 8000E series

2.1 Apply Power to 8430/8431/8830/8831



The power supply applied to 8430/8431/8830/8831 can be any where from +10V to +30V DC unregulated. The power input connectors of the MCU (Main Control Unit) and I/O expansion modules are screw terminals and not designed for hot-plug applications. So it is recommended to power off the power supply before the wire connection is finished.

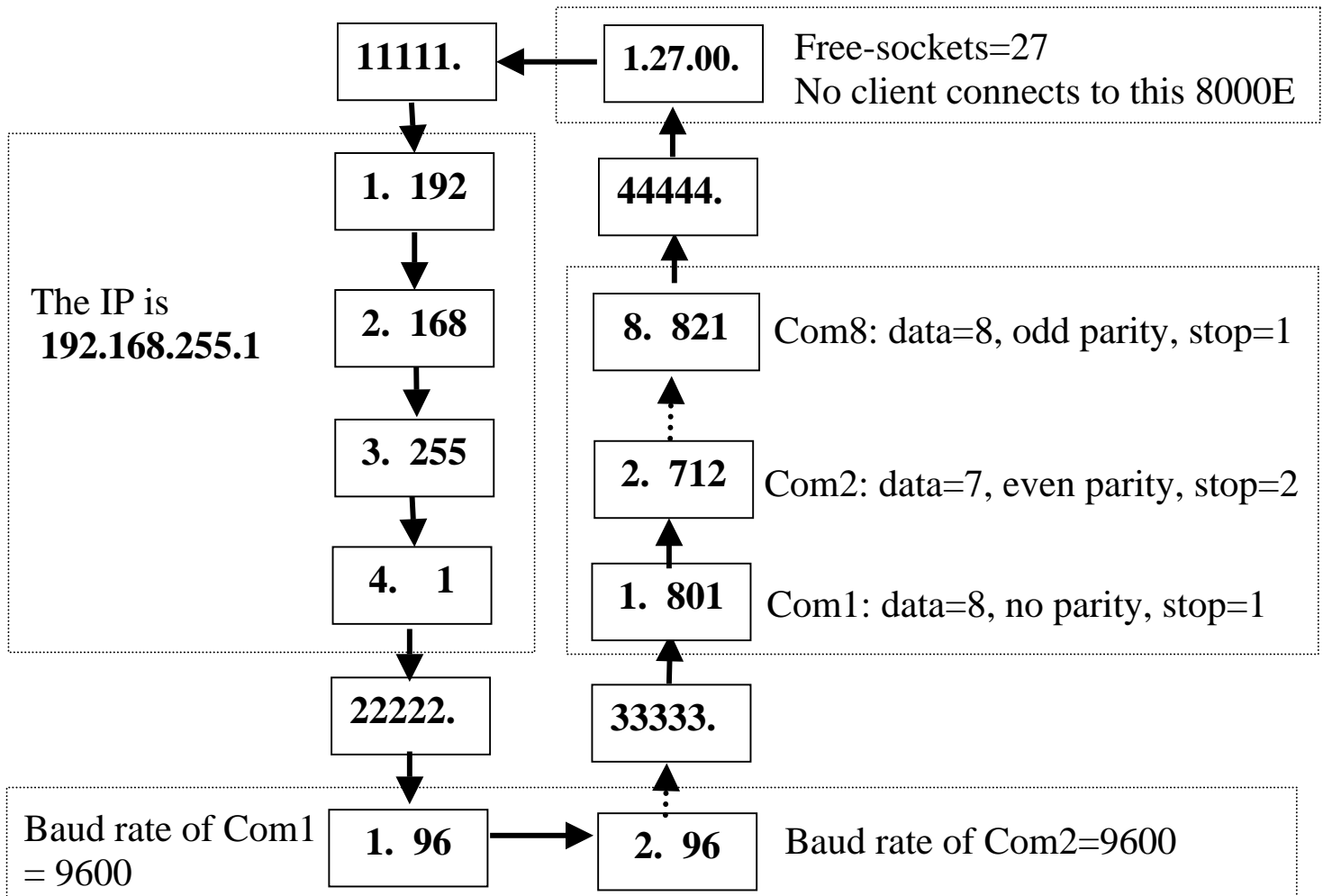
The parallel I/O expansion modules and serial I/O expansion modules cannot hot-plug to/from 8430/8431/8830/8831. So the power supply must turn off first before I/O modules are installed/removed from 8430/8431/8830/8831.

Note:

- **Power off the power supply first** when I/O modules are **installed into** 8430/8431/8830/8831.
- **Power off the power supply first** when I/O modules are **removed from** 8430/8431/8830/8831.

2.2 Check the 7-Seg LED

The 5-digit of 7-SEG LED will show as follows:



The important information of 8000E series can be divided as follows:

Group-ID 11111: IP information of this 8000E

Group-ID 22222: baud rate of all COM ports

Group-ID 33333: configuration of COM ports

Group-ID 44444: Client-connected information of this 8000E

The IP-format of this 8000E is given as follows:

Group-ID of 5-digit LED: 11111

LED-1: indicator, can be 1 or 2 or 3 or 4

LED-2~5: IP

The LED will show Group-ID first, then show its IP as above diagram. If users change the IP, the value shown will also change immediately. The default shipping IP = 192.168.255.1 → the LED-show sequence is given as above diagram.

The baud-rate formats of COM ports are given as follows:

Group-ID of 5-digit LED: 22222

LED-1: COM port number

LED-2~5: value of (baud-rate/100)

The COM port number is shown in the LED-1 and its baud rate is shown in the LED-2~5. The baud rate = (value of LED-2~5) * 100. For example, shown value = 1.96 means baud rate of the COM1= 9600 BPS; 2.1152 means baud rate of the COM2 = 115200 BPS. All baud rates of COM ports will be shown one by one.

The configurations of COM ports are given as follows:

Group ID of 5-digit LED: 33333

LED-1: COM port number

LED-3: data bit, 5 or 6 or 7 or 8

LED-4: parity bit, 0=no parity, 1=Even parity, 2=Odd parity

LED-5: stop bit, 1 or 2

The Client-connected information is given as follows:

LED-1: 1=in the reset state, 0=not in the reset state

LED-2/3: number of free sockets are available

LED-4/5: number of sockets are used by clients

When the 8000E is first power-up or just been reset, the reset state = 1. If any clients connect to this 8000E, the reset state will be changed to 0 and free sockets will be decreased and used sockets will be increased. If the free-sockets number is reduced to 0, then no extra clients can link to this 8000E. The initial free sockets of the **8430/8830** are **27**, so there can be 27 clients link to the 8430/8830. And the initial free sockets of the **8431/8831** are **26**.

If the 5-digit LEDs do not shown properly, you can do the following steps:

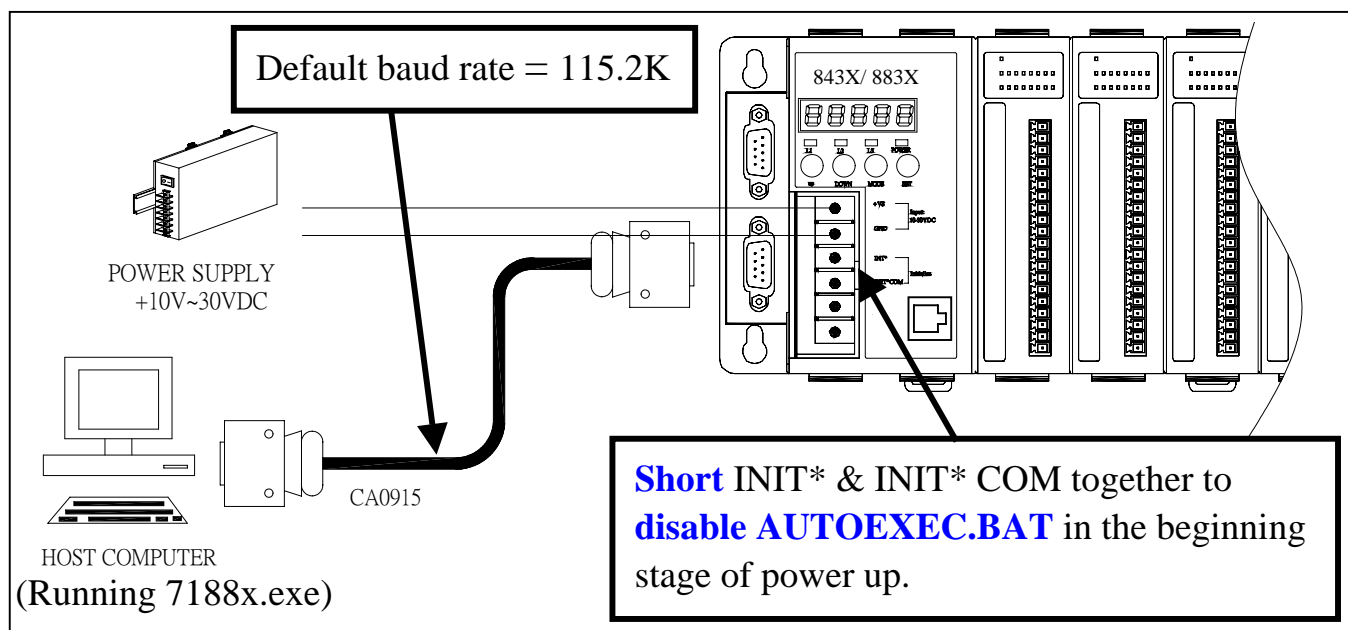
Step 1: power off

Step 2: connect INIT* to VS+

Step 3: power on and check the 5-digit LEDs again

If the 5-digit LEDs displays the correct information, then wire the INIT* to VS+ when you are running the Xserverre inside the 8000E.

2.3 Linking to Program-development PC



Step 1: Connect download-cable, CA0915, to COM1 of 8000E and COM1/2 of program-develop PC as above diagram.

Step 2: Connect INIT* and INIT*COM together as above diagram

Step 3: Install 7188X.EXE to program-develop PC

Step 4: Apply power (+Vs, GND) to the 8000E. +Vs can be any where from +30V to +10V.

Step 5: Check the 5-digit of 7-SEG LED will continuously show as follows:

Hour.Minute.Second

Step 6: Run 7188X.EXE /C#, and change baud rate to 115200, N81. "/C#" is the COM port of the program-development PC.

Step 7: Press [Enter] twice in program-develop PC as follows:

```

7188x for WIN32 version 1.08 (12/27/2001)[By ICPDAS. Tsai, Kun-Ting.]
Current set: Use COM1 115200,N,8,1
AutoRun:
Autodownload files: None
Current work directory="D:\\"
original baudrate = 115200!
now baudrate = 115200!

8000>

```

Step 8: Execute “ver” command to get version information about MiniOS7 and the hardware serial number.

```

8000>ver
ICP_DAS MiniOS7 for 8000-485 Ver. 1.03 build 024,Nov 08 2001 17:02:15
SRAM:512K, FLASH MEMORY:512K
Serial number= 09 26 04 3A 03 00 00 60
8000>

```

Note: The 8430/8830 does not equip a hardware serial number, so the serial number is 5A. For 8431/8831, the hardware serial number will be shown in the above screen.

Step 9: Read configuration of 8430/8830/8431/8831 as follows:

```

8000>ip
IP=192.168.255.1
8000>mask
MASK=255.255.0.0
8000>gateway
Gateway=192.168.0.1
8000>mac
Ethernet Address=00:80:33:32:11:92
8000>setcom 1
Current set is: 9600,8,0,1 [checksum:AE,OK]
8000>_

```

Reading configuration command

- ip
- mask
- gateway
- mac
- setcom port

Note: You can change the configuration of the 8000E as follows:

```

i7188e>ip 192.168.41.4
Set IP=192.168.41.4
[ReadBack]IP=192.168.41.4
i7188e>mask 255.255.255.0
Set MASK=255.255.255.0
[ReadBack]MASK=255.255.255.0
i7188e>gateway 192.168.41.1
Set GATEWAY=192.168.41.1
[ReadBack]Gateway=192.168.41.1
i7188e>setcom 1 115200,n,8,1
Current set is: 9600,8,0,1 [checksum:AE,OK]
Set to: 115200,8,0,1 [checksum:CC,OK]
i7188e>

```

Setting configuration command

- ip [new ip]
- mask [new mask]
- gateway [new gateway]
- mac [new mac]
- setcom port
[baud][data_bit][parity][stop_bit]

Parameters of “setcom” are as follows:

port: 1-8

baud: 2-921600

databit:

7,8: for COM1 and COM2

5,6,7,8: for COM3 ~ COM8

parity:

N, n: None parity

E, e: Even parity

O, o: Odd parity

M, m: Mark, parity=1

S, s: Space, parity=0

stopbit:

1: for COM1, COM2

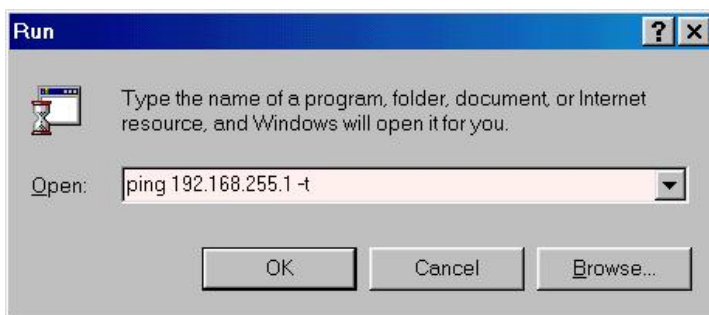
1, 2: for COM3 ~ COM8

Step 10: Disconnect INIT* & INIT*COM

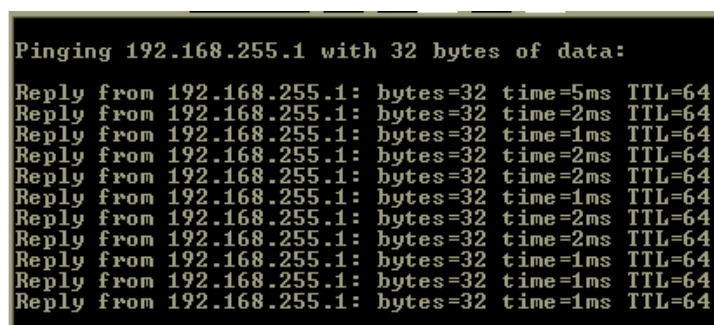
Step 11: power off then power on

Step 12: execute **ping 192.168.255.1 -t**

in host-PC as follows:



← Execute Ping 192.168.255.1 in host-PC



← Ping results must be smooth & continuous

Note:

192.168.255.1 is the default IP address of the 8000E.

If host-PC cannot ping the 8000E without problems, please refer to step 8 to change configuration of the 8000E to suit your network environment.

The mac address of the 8000E must be unique in the same network.

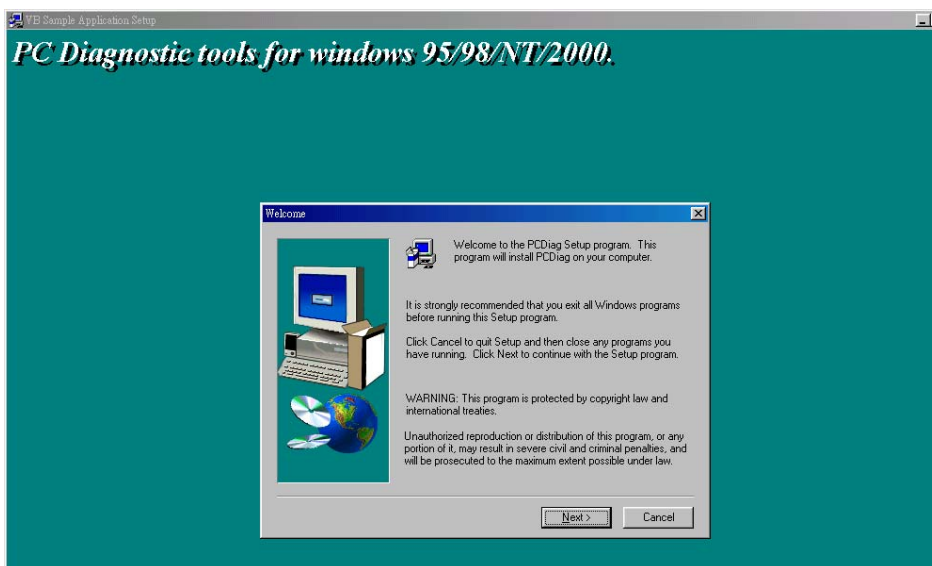
In general, if the host PC can ping the 8000E smoothly and continuously, all other softwares and drivers for the 8000E will work fine. Therefore, users should make sure host-PC can ping the 7188E smoothly before any further testing.

2.4 Configure Wizard

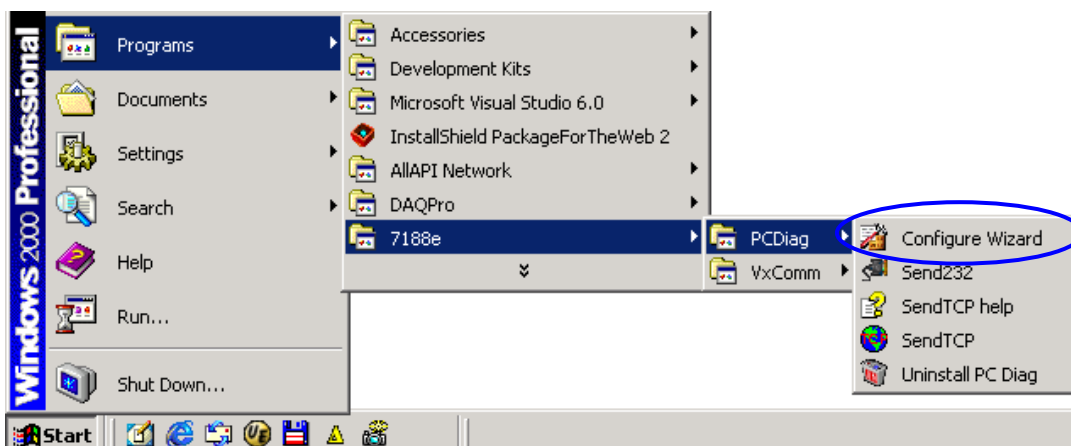
The most important step when using the 8000E family is to set the IP, mask and gateway correctly. This is not an easy job for newcomers. Therefore, we've designed a configure wizard to automatically set the configuration of the 8000E.

Step 1: Refer to Sec. 2.3 for wire connection of the 8000E.

Step 2: Install configure wizard as follows: (refer to Section 1.3 of "8000E Series Software User's Manual" for more information)



Step 3: Run the configure wizard as follows:

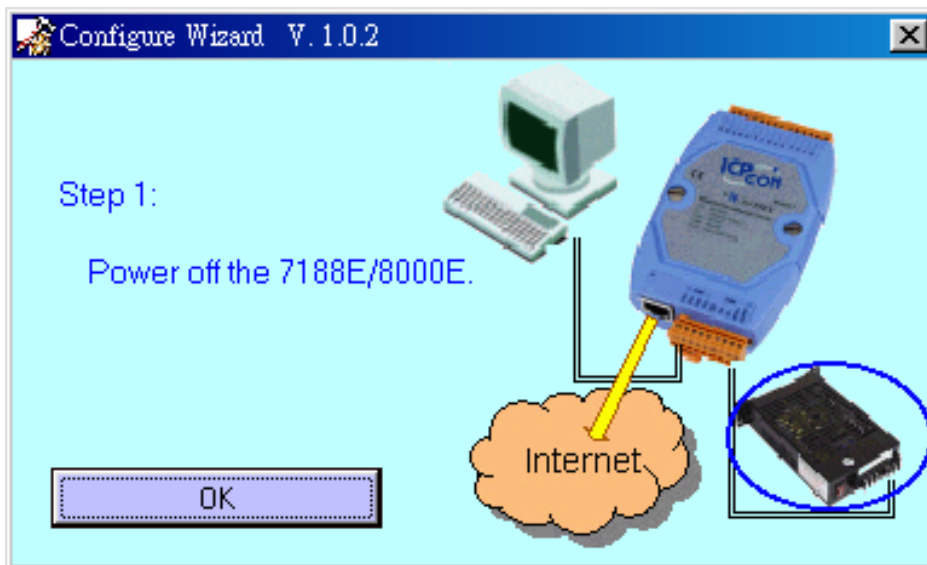


Step 4: The starting page of the Configure Wizard is given as follows:



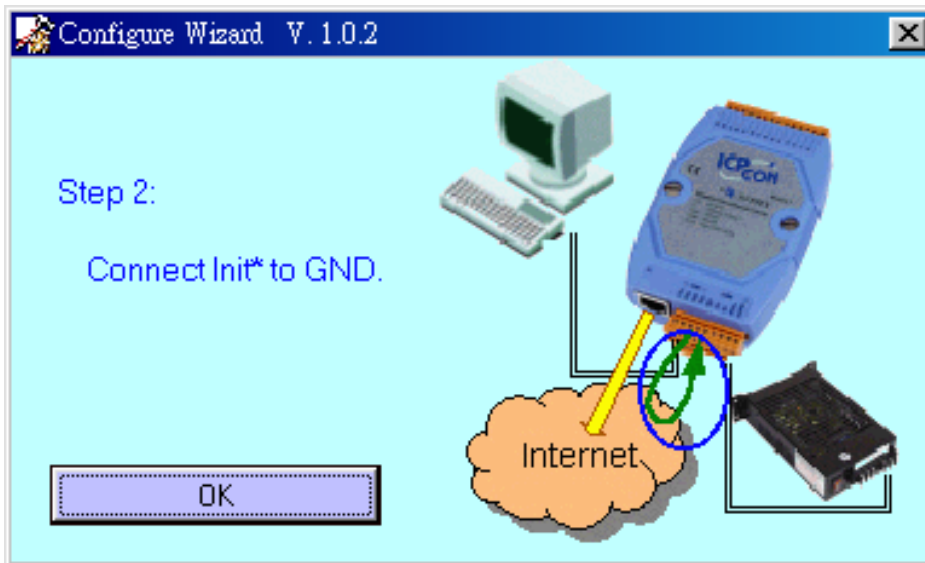
Click Custom to proceed to next step.

Step 5: Step2 of the Configure Wizard is as follows:



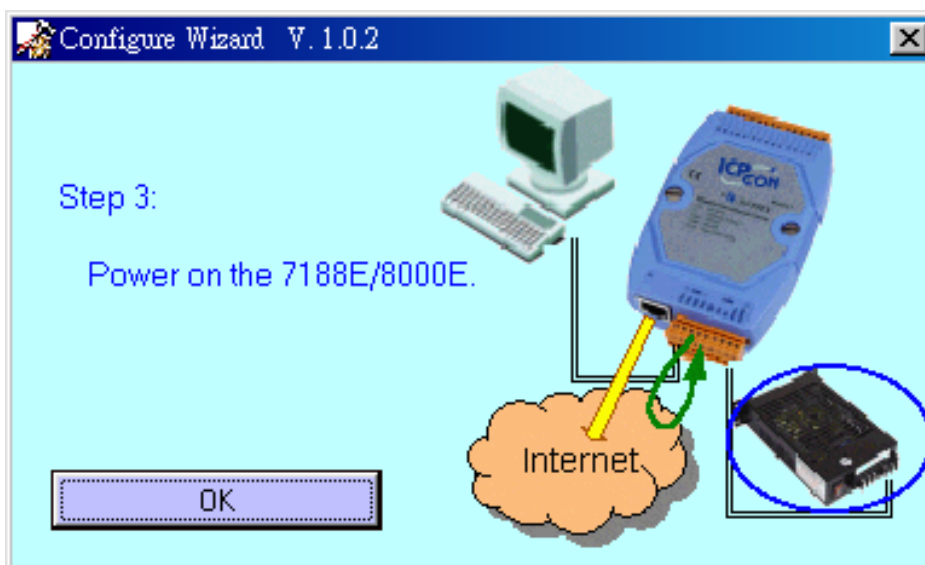
Power off the 7188E/8000E

Step 6: Step2 of the Configure Wizard is as follows:



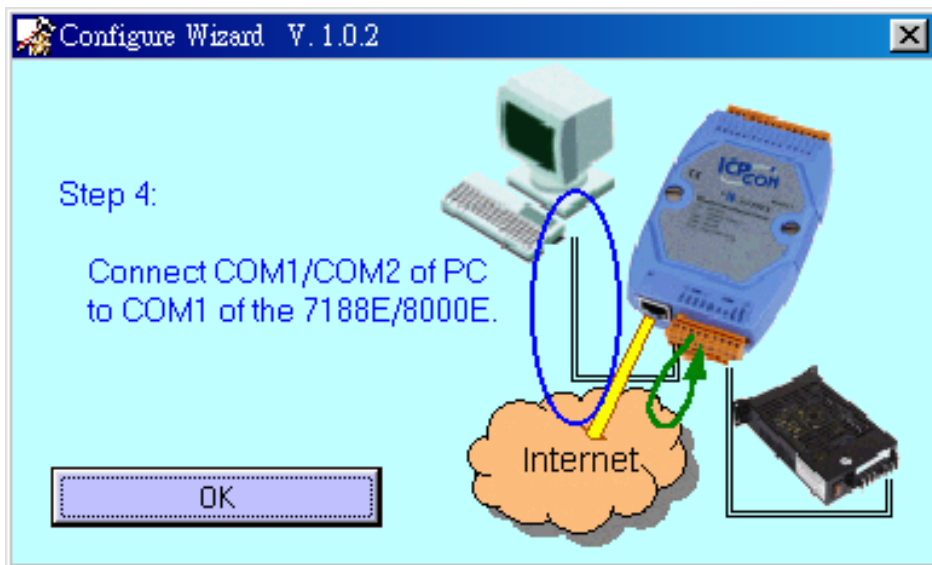
Connect INIT*-pin of 7188E/8000E to GND-pin of 7188E/8000E

Step 7: Step3 of the Configure Wizard is as follows:



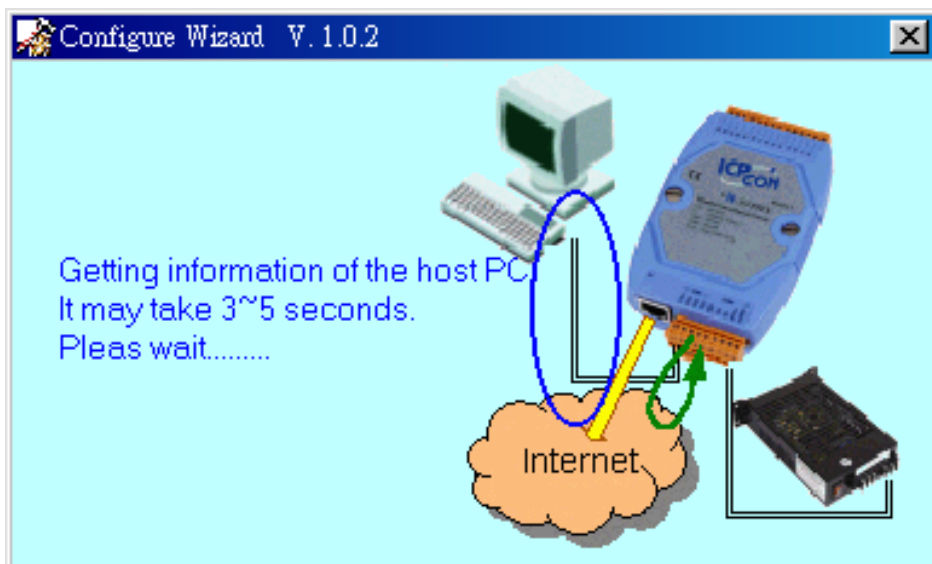
Apply power to 7188E/8000E

Step 8: Step4 of the Configure Wizard is as follows:

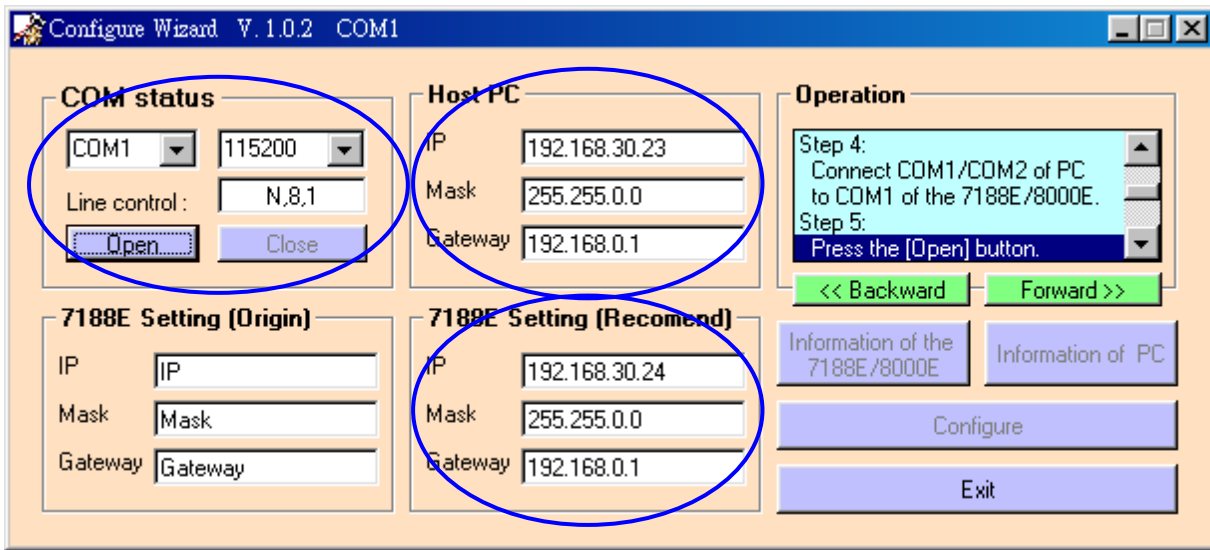


Connect CA0915 to 7188E/8000E & PC (refer to Sec. 2.3)

Step 9: Currently, the Configure Wizard will get the host-PC's configuration as follows:

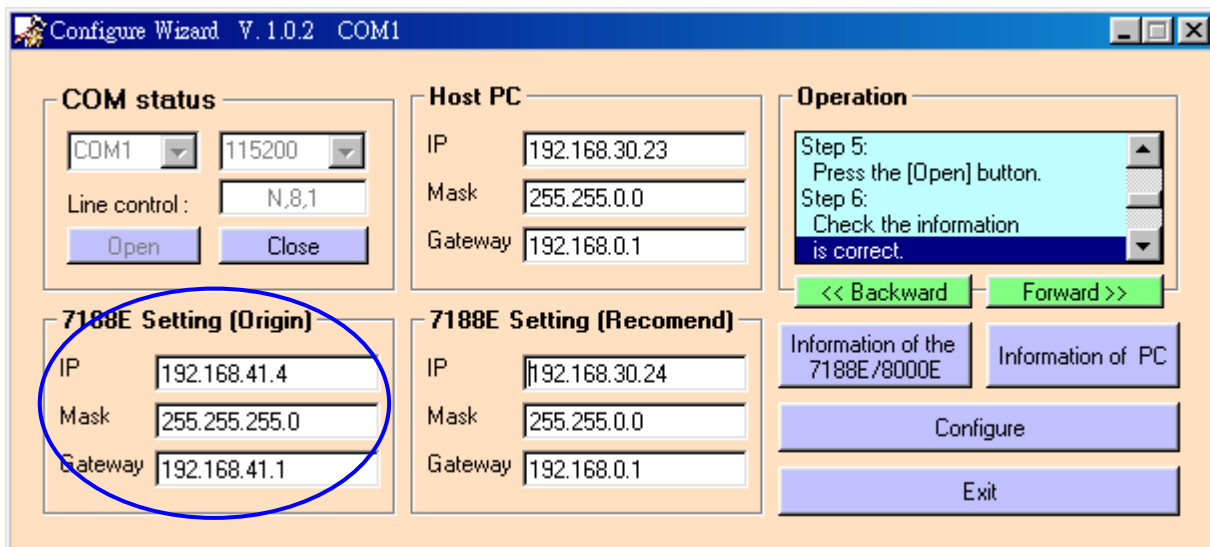


Step 10: The host-PC's configuration and the recommended configuration of this 7188E are given as follows:



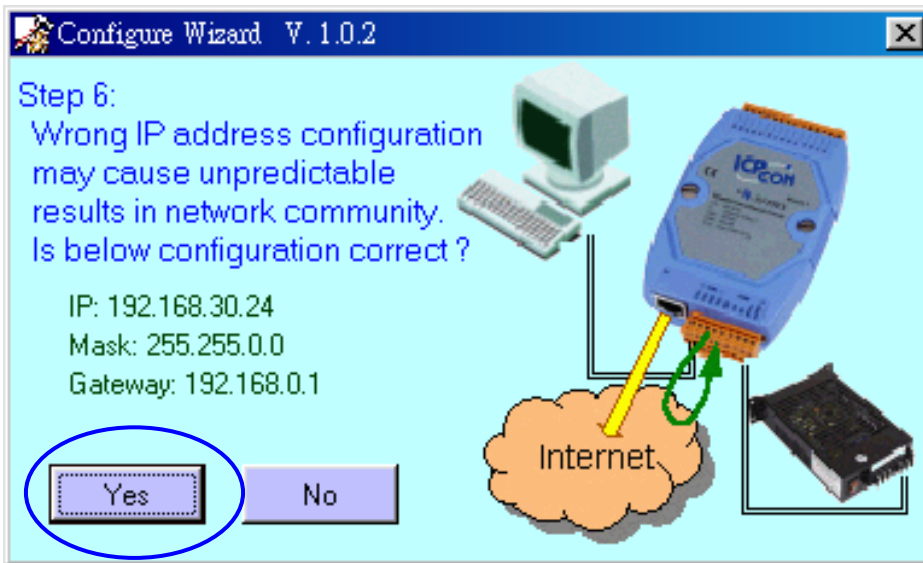
Select the correct COM status of host-PC
Then Click Open

Step 11: Now the current configuration of this 7188E is given as follows:

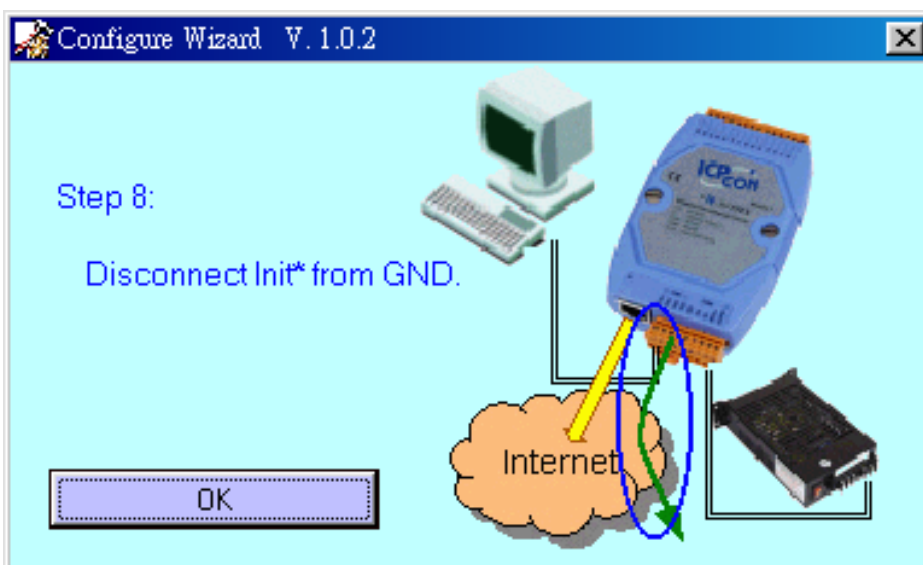


Click Configure to set the new configuration of this 7188E

Step 12: Click “Yes” to confirm the setting as follows:

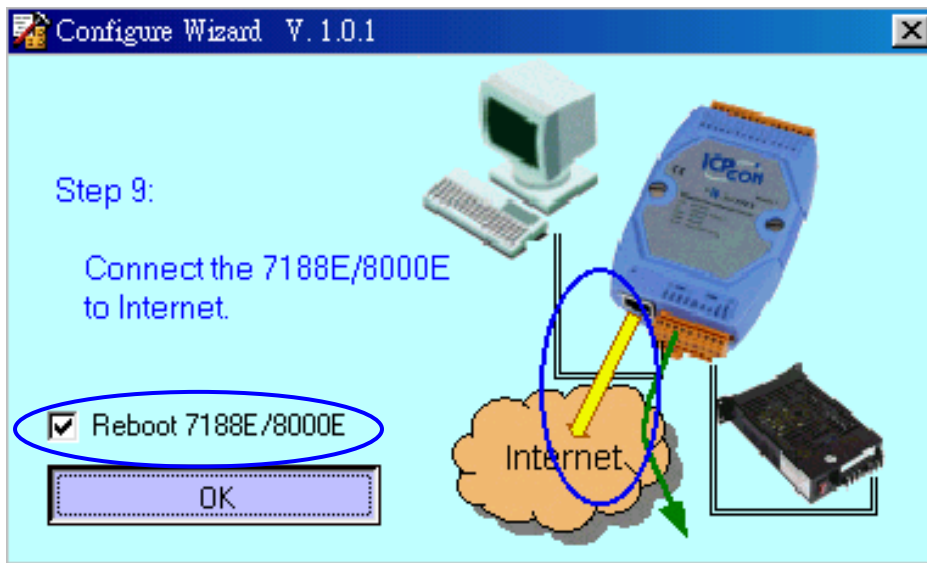


Step 13: Step 8 of the Configure Wizard is as follows:



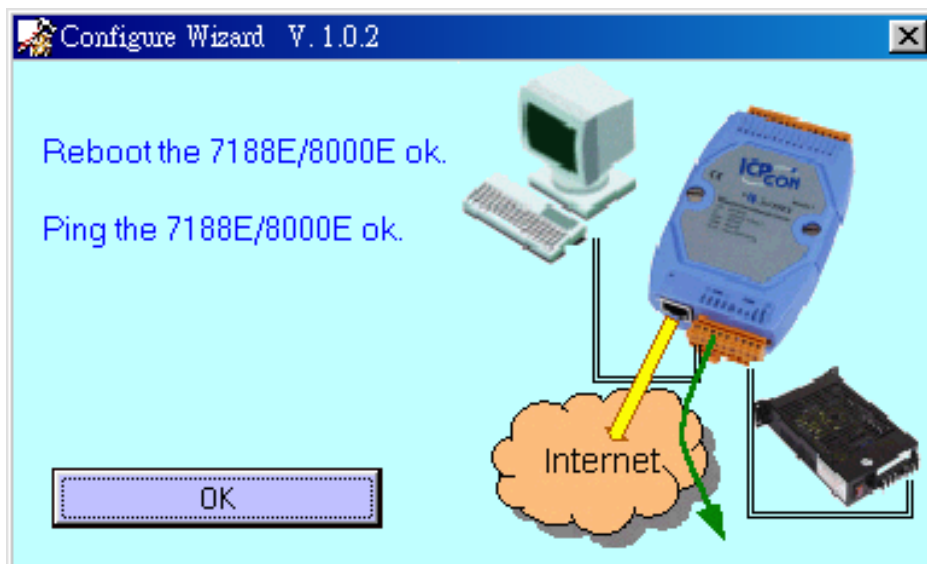
Disconnect INIT*-pin from GND-pin of 7188E
Click OK

Step 14: Step9 of the Configure Wizard is as follows:



Enable Reboot 7188E/8000E
Click OK

Step 15: The setting of 7188E is successful as follows:



2.5 Configure 87K modules

Step 1: Execute “diag” command. MiniOS7 will list information of the hardware, including memory and 8000 modules and 87k modules plugged in the main Unit.

```
8000>diag
Init* pin is Open
Sram=512K Flash Memory=512K Addr(ID)=0(00)
Manufacturer=01(AMD) ID=A4(size=512K) Protect mode=00000000
reset by [Power ON reset]
Slot number=4
Slot 0 = 8051
Slot 1 = 8056
Slot 2 = 87051
Slot 3 = 87018
ASCKEY99 is OK.
8000>
```

Step 2: Execute “use com0” command. Then commands will be sent form CPU throught back plane to slots.

```
8000>use com0
COM0 : baudrate=115200 --> timeout=8 ms
StartAddr=0 EndAddr=255
[87K]
```

Step3: Execute “slot N” command, with N being the slot you want to send commands to.

```
[87K]slot 3
Change to SLOT 3
[87K]_
```

Step4: Send commands to the 87K modules plugged in the slot you selected in Step 3. For example: “\$AAM” to ask the module’s ID and “\$AAF” to ask the module’s firmware version, with AA being the main Unit address.

```
[87K]$00M
Com0Echo I!0087018<0ms>
[87K]$00F
Com0Echo I!00A1.0<0ms>
[87K]_
```

Note:

- When you use Com0, AA will always be 00.
- The method described above just only for the 87K modules. You cannot

perform 8000 modules by the same way.

- Please refer to the commands described in 7000 series user's manuals when you send commands from 8000's COM0 to 87K modules.
For example: refer to the "7000 DIO User Manual" when configuring 87K DIO modules; refer to 7018 user manual when configuring 87018.
- All the manuals about 7000 series are in "CD\Napdos\7000>manual".
- You cannot use commands described in on-line user's manual (*.htm) when you send commands from 8000's COM0 to 87K modules.

2.6 Update the MiniOS7

Caution !!!

- The MiniOS7s for the 8000 series and 7188E are different. You cannot download image files for 7188E into 8000 series.
- You cannot use the 7188, 7188X, 7188E and 8000 series modules without the MiniOS7. When you are updating the MiniOS7, **don't power off the module**, especially in the step4 and step5.
- Before updating the MiniOS7, please **contact to the distributor to make sure** that you really understand how to update the MiniOS7 very clear.

To update the MiniOS7, follow below steps:

Step 1: copy the newer version MiniOS7 image file to the working path (For example, D:\).

Note: the file name of the image file is named by date. For example, 80011227.img, means the image file is for 8000 series, and its date is 2001,Dec, 27th.

Step 2: change the current directory to D:\, and run 7188xw.exe.

Step 3: execute “ver” command to get the current version of th MiniOS7.

```
8000>ver
ICP_DAS MiniOS7 for 8000-485 Ver. 1.03 build 024,Nov 08 2001 17:02:15
SRAM:512K, FLASH MEMORY:512K
Serial number= 09 26 04 3A 03 00 00 60
8000>_
```

Step 4: execute “upload” command, and key in the image file name. **Don’t power off the module!**

```
8000>upload
Press ALT_E to download file!
Input filename:800011227.img
Load file:800011227.img
Send file info. total 256 blocks
Block 256
Transfer time is: 7.015000 seconds
CRC16=C6F3
7000:FFFE=7188
8000>_
```

Step 5: Until the image file is completely uploaded. Execute “bios1” command. **Don’t power off the module!**

```
8000>bios1
MiniOs7 for 8000 Ver 1.03.025, date=12/27/2001
Checking CRC-16...OK.
Write to Flash memory, please wait about 10 secs.
After update finished, the system will auto reboot.
If it take too long, please reset by power On-Off.
8000>
```

Step 6: execute “ver” to check the newer version of the MiniOS7 was already downloaded into the memory.

```
8000>ver
ICP_DAS MiniOS7 for 8000-485 Ver. 1.03 build 025,Dec 27 2001 15:30:14
SRAM:512K, FLASH MEMORY:512K
Serial number= 09 26 04 3A 03 00 00 60
8000>_
```

Note:

- The image files of the MiniOS7 for the 8000 series are located at 8000\Common\MiniOS7\
- The image files of the MiniOS7 for the 7188E series are located at 7188E\MiniOS7\