



Ethernet Modem Frequently Asked Questions:

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Is any programming required to use the Ethernet Modem?

No programming is required. The Ethernet Modem is normally configured using a terminal temporarily connected to the console port. In those cases where the EM1000 is a "master" in a point to multi-point arrangement, then the attached device will need to send some simple text based commands to the EM1000. Demo



programs are available which demonstrate this. Although a wide variety of configuration options are available to handle unusual cases, in most situations, simple modifications to the default parameters will suffice. This procedure takes only a minute or two.

What baud rates can the EM1000 handle on the data port?

This depends on many factors. Generally, operation to 19200 is no problem, and if flow control is used (in conjunction with the RTSMODE=FLOW configuration string), operation at baud rates to 38400 is possible.

How does the EM1000 handle 10Mbps on one side, and lower baud rates on the other side?

The TCP/IP protocol stack works via a handshake mechanism, where there is an acknowledgement process that prevents the transmitter from sending too much data for the receiver to process. The internal buffer set to 2K bytes. If more than 2K bytes of data are received by the TCP/IP software layer, and the EtherCom application has not read the data, then no further incoming data will be acknowledged, and then the sender of the data will not be allowed to send any more. The depth of the buffering really doesn't matter, because the TCP/IP layer of software will throttle the sender of the information, so that no data is lost.

What is the temperature rating of the EM1000?

The EM1000 operating and storage temperature range is -40C to +70C. Some early brochures showed a more restricted temperature range which was incorrect.

Can the EM1000 be used with daisy-chain hookups (e.g. 10Base2), rather than with hubs?

The EM1000 is optimized for use with standard 10BaseT cables and hubs. Z-World recommends this because the resulting network is more reliable than with a daisy chain network. If a connection is broken in a hub based system, only one unit goes down, as opposed to the entire network going down if a daisy chain wire is broken.

Can the Ethernet Modem be used with RS485 devices?

If you have a need for the EM1000 to interface to a number of RS485 devices, the best approach is to use a Z-World controller as a programmable RS485 link master.



The controller must have an available RS232 port and an RS485 port. Then program the Z-World controller to act as a master on the RS485 network, and transfer data from the multiple RS485 devices through the RS232 port to the Ethernet Modem (and onwards to its final destination). The EM1000 does not directly support RS-485.

I can't use some commands from Telnet, or via the COM1 port, or when using the SOURCE command invoked from Telnet or COM1?

Some of the command options available directly at the COM2 port are related only to initial setup and configuration (for example "EXIT"). If you are using Telnet to a VERY remote location, and you were to accidentally type EXIT, then you LOSE the TCP/IP connection, the Telnet connection, and you have no way to restart the modem (except to actually GO there, and hook up to COM2). In the initial release of the software the following commands could not be executed via Telnet or the COM1 port: EXIT, GATEWAY, MY_IP, NETMASK. In the 01/13/2000 version of the software, the MY_IP command could also be executed from COM1. The 03/27/2000 version of the software also allows MY_IP, NETMASK, and GATEWAY to be changed via the Telnet port. This feature should be exercised with caution, since changing these parameters will cause the Telnet session to be lost. It will be necessary to re-establish the Telnet session to the new IP address. If you want the new parameters to be used after an EM1000 reset or power cycle, you need to issue this command after the new Telnet session is established: `SHOW > DWN.EM`.

Why is the built-in editor so primitive? Why can't we provide a full screen editor?

This is due to the fact that the only way to display information in the Ethernet Modem is to send it to a terminal device through the serial port. There would be no efficient way to refresh the screen after each keystroke. The editor is line based, so you basically type a command on a line, or insert a line, then the modem responds with a full line, or bunch of lines. Since the editing requirements for the product are quite slim, this approach is not hard to deal with.

Can the Ethernet modem be used in a point to multi-point application?

Yes. The Ethernet modem can be made to first establish a connection to a remote address, communicate data, drop that connection, then establish a connection to a totally different remote address. To reprogram the modem on the fly for this type of



operation, it is necessary that the attached device either have a second serial port, or a controllable DTR line from serial port connected to COM1 of the modem, or an available digital output that can connect to the CTL line of the modem.

Can I use logic level signals with the modem instead of RS-232 level signals?

Yes. On board jumpers allow the COM1 port to be set for either logic levels, or RS-232 levels.

I need an "IP Addressable Controller Card". Does Z-World have such a thing?

Yes. The combination of a Z-World controller plus the EM1000 Ethernet Modem provides this capability.

Does the Ethernet Modem support standard TCP/IP ports?

Yes. The Ethernet Modem can be set up to transmit to, and receive from any TCP/IP port.

I'm getting gibberish on my Hyperterminal display, and the baud rate and other settings are correct. What do I need to do?

Try selecting a different font in Hyperterm. On initial use, Hyperterm will sometimes NOT use the font that it says is actually in use, and you need to CHANGE the font in order to get it to work properly. When using Hyperterm, it may also be necessary to SAVE baud rate changes (or even exit the program, and re-enter) after making setup changes.

How many Ethernet Modems do I need in order to play with in a realistic situation?

If you have an existing Ethernet installation, and your system administrator provides authorization and support, you can purchase a single unit and do some useful things with it. If you are starting a network from scratch, or if you want to check the units out prior to installing on an operating network, you need at least 2 Ethernet Modems.



Does the EM1000 have battery backed memory?

No. A battery is not needed since the executable program is located in flash memory. There is no battery to become depleted, or which ever needs replaced.

Can I upgrade the EM1000 software in the future?

Yes. As updates become available, you can download the file(s) from the Z-World web site, and then reload your EM1000 by connecting the Console port on the EM1000 to your PC.

What types of data transfers are efficient over Ethernet?

Ethernet is high speed bus, and efficiency is not normally an issue. However, in terms of raw data transfer capability, the best scenario is to open a link, keep it open, and send large blocks of data. There is some overhead both in the modem and on TCP/IP when you open and close links, so opening and closing links a lot tends to reduce overall throughput. Also, to send even a single byte from one end of the link to the other requires additional overhead bytes, so sending large blocks of data is more efficient than sending more numerous small blocks.

Does the EM1000 have any built-in remote network management tools?

Yes, there are some simple tools built-into the EM1000. Using Telnet, you can determine the status of open and closed connections (IP addresses and port numbers), determine the number of packets and bytes transmitted and received, and watch the actual data flowing through the EM1000. Also using Telnet, it is possible to issue most of the configuration commands that can be issued locally.

How does IP and port addressing work on the EM1000?

Think of the EM1000 as having 2 modes - a "listen" (open on demand) mode where the device at the other end of the link opens the link, and an "active" mode where the EM1000 opens the link. Quite often, the listening device is called a server, and the active device is called a client.

"My_ip" and "Hostdataport" are EM1000 parameters used when the EM1000 is in listen / demand / server mode. They establish the EM1000 network address where



the EM1000s COM1 port resides. *These parameters set up a logical connection inside the EM1000 from ethernet to the COM1 port.* You will need to ensure that the client's "remote IP address and remote port number" correspond to the my_ip and hostdataport which were programmed in the EM1000. The client device will be using its own IP address and port number which are independent of the EM1000's my_ip or hostdataport. When a connection is initially made from a client to an EM1000 in listen mode, the EM1000 will report "Data connection established to [client's IP address and port number]." The client may display a similar message, such as "connection established to EM1000's my_ip and hostdataport".

For the EM1000, my_ip is set in the wattcp.cfg file, and hostdataport is set in the dwn.em file.

"Remotename" and "Remoteport" are used when the EM1000 is in active (client) mode, and will be opening the link. Hostdataport has no meaning for an EM1000 in active mode. The EM1000 will open the link, and attempt to exchange its COM1 data with the remote server at the address defined by remotename + remoteport. Remotename must be set to the IP address of the remote server, and remoteport must be set to a server port number at which the server is listening. If successful, the EM1000 will report "Data connection established to [remotename + remoteport]."

If the remote device is an EM1000 in listen mode, then this active unit's remotename and remoteport need to correspond to the remote unit's my_ip and hostdataport.

The EM1000 has 2 more parameters which are related to addressing. Localstateport and remotestateport work identically to hostdataport and remoteport, except they refer to the EM1000 modem control signals (RTS, CTS, DTR, DSR) instead of the data transmit and receive signals.

When using only EM1000s in a network, you can generally leave the port addresses at the default values and not worry about it. If your EM1000s are in active mode, be sure that their remotename and remoteport parameters correspond to the server's. If your EM1000s are in listen mode, be sure that your my_ip and hostdataport are set the same as the active (client) unit's remotename and remoteport.



How do I feed data directly from the Ethernet Modem into an application program running on the PC (such as a spreadsheet, or database)?

There are third party software packages, such as TCPWedge from Taltech (www.taltech.com) which provide a DDE connection between the TCP/IP port in the computer to the application program. These programs can generally be configured to get data into and out of a database or spreadsheet with no programming involved. This allows a remote EM1000 to send data to the PC's TCP/IP address and port number, and then have that data automatically imported to the application. It is even possible to have multiple instances of TCPWedge running, and have multiple EM1000s talking to the same application in your PC! Note: When TCPWedge is in Client mode, the EM1000 must be in demand mode. If the EM1000 is in either request or active mode, the hostdata port is already used, and TCPWedge cannot communicate with it.

I have an EM1000 connected to only 1 other PC. I can't make it communicate over Ethernet.

Be sure your PC has an IP address assigned. If this is a virgin PC, try setting the address to 10.10.10.20, and the netmask to 255.255.255.0. This is done in the control panel / network / protocols / TCP/IP screens. Then reboot your computer. If you have pulled the PC off a running ethernet network, or intend to put it back on an existing network, check with your system administrator before changing the IP address and netmask.

How can I remotely close an open link to the EM1000?

Situations may occur where a data link has been established to the EM1000, and you wish to manually break the link. For example, a device establishes a connection to an EM1000 which is in the listen mode. Then the device is supposed to do its business and drop the link, but it actually fails to drop the link. You can manually drop the link by Telnetting into the EM1000, and setting `CONNECT=REQUEST`, then `CLOSE`. Then set the `CONNECT` mode back to its original state (`CONNECT=DEMAND`).



I can't seem to Telnet to the host data port of my EM1000.

During debugging, it is sometimes convenient to Telnet not to the actual Telnet port in the EM1000, but to the data port (default 8888) of the EM1000. This way, in your Telnet session you can see directly what the device attached to the remote EM1000 is sending into the serial port. However, for this to work, the EM1000 must be set to CONNECT=DEMAND mode.

What DOS level commands are available?

When the Ethernet Modem application is not being run, the Ethernet Modem is in DOS mode. The EM1000 uses XDOS, a compact operating system for embedded applications. The XDOS command structure is nearly identical to MS/PC DOS version 3.3. The switches for the DIR command have been changed and expanded. XDOS does not support redirected input or output with the use of < and >, but does support pipes (|). None of the external DOS commands are provided due to storage constraints. XDOS does not support installable file system functions.

XDOS Command Reference

In the list below, XDOS commands are followed by a function description and their format including available parameters and switches. Items in boldface type must be entered. Capitals or lowercase letters may be used. Items in italics are parameters. Those in boldface italics must be entered, those in [] are optional. All switches are optional. They are shown as [/X]. Spaces and punctuation are to be included. An ellipsis ... following items means that you may repeat the items as often as needed. Do not enter the ellipsis or the square brackets. Most XDOS commands allow the use of wildcards in filenames and extensions. When wildcards (?=one character, *=any character or characters) are used, the command is executed once for each matching file.

Common parameters are:

- [*d:*] drive specification - a letter followed by a colon (:), e.g. A:, if no drive is specified, the default drive is used.
- [*path*] the path DOS must take in traveling from one directory to another; directory names are separated by a backslash (\).
- [*filename*] up to 8 characters used to name a file.
- [*.ext*] a three character extension may be added to a filename; an extension is separated from a filename by a period.

CD / CHDIR

Function: Changes the current directory



Format: **CD** or **CHDIR** [[d:]path]

COPY

Function: Copies a file, combines two or more files into one file, or transfers data between files and DOS devices

Format: **COPY** [d:][path]filename[.ext][switches]
 +[d:][path]filename[.ext][switches]
 [d:][path][filename[.ext]][switches]

Switches: /V - verify the contents of new file
 /A - copy file in ASCII format
 /B - copy file in binary format

DATE

Function: Displays or changes the current DOS date.

Format: **DATE** [mm-dd-yyyy]

DEL / ERASE

Function: Deletes (erases) one or more files from a disk

Format: **DEL** or **ERASE** [d:][path][filename[.ext]]

DIR

Function: Lists directory entries

Format: **DIR** [d:][path][filename[.ext]][switches]

Switches: /a - display file attributes
 /b - sort by file size (in bytes)
 /d - sort entries by date and time
 /f - display entries by alphabetic file name order
 /n - display entries in directory order (do not sort)
 /s - include system and hidden files in output
 /h - display this Help screen (any invalid key)

MD / MKDIR

Function: Creates a subdirectory

Format: **MD** or **MKDIR** [d:]path

PATH

Function: Specifies directories that DOS is to search when trying to locate executable files

Format: **PATH** [[d:]path[;[d:]path ...]]

PROMPT

Function: Sets the DOS system prompt

Format: **PROMPT** [text]

Text: Resulting Character(s):
 \$tThe current time stored by DOS
 \$dThe current date stored by DOS



\$pThe current directory
\$vThe version of DOS being used
\$nThe default drive
\$gThe character >
\$!The character <
\$bThe character |
\$qThe character =
\$\$The character \$
\$_Carriage return plus line feed

REN

Function: Renames a file
Format: **REN** [d:][path]filename[.ext] filename[.ext]

RD / RMDIR

Function: Deletes a subdirectory
Format: **RD** or **RMDIR** [d:]path

TIME

Function: Displays or changes the current DOS time
Format: **TIME** [hh:mm:ss.xx]

TYPE

Function: Display the contents of a file
Format: **TYPE** [d:][path]filename[.ext]

VER

Function: Displays the DOS version number
Format: **VER**

VOL

Function: Displays the volume label of specified drive
Format: **VOL** [d:]

When I power cycle my RS-232 device, the EM1000 locks up.

Your COM1 “handshake” signals are probably not hooked up properly. If you were communicating data successfully before the lockup, then your transmit and receive lines are probably OK (pins 2 and 3 on COM1). However, your other signals may not be hooked up correctly. If you attach an in-line LED mini tester, all the signal



lines should be ON or OFF (Red LED or Green LED). If you have any LEDs that are off, or very weakly red or green, you may have an incorrect hookup.

I want to use a protocol such as XMODEM or ZMODEM to transmit data from one EM1000 to the other.

You may need to look at the timing details of the protocol you want to use, and tweak the packetization parameters in both EM1000s. Generally, from testing done at Z-World, it appears that using the default parameters (bufferlength = 200, buffertimeout = 2), that the ZMODEM protocol is the most efficient, and 9600 baud is the best baud rate to use. Depending on the type of equipment you are transmitting and receiving from, your results may be better at different baud rates or using different protocols. If you do not have ZMODEM available, then try using XMODEM (CRC). The throughput seems to be about half that of ZMODEM, and there is a significant lag on startup.