

M-NET



INSTALLATION AND OPERATION MANUAL

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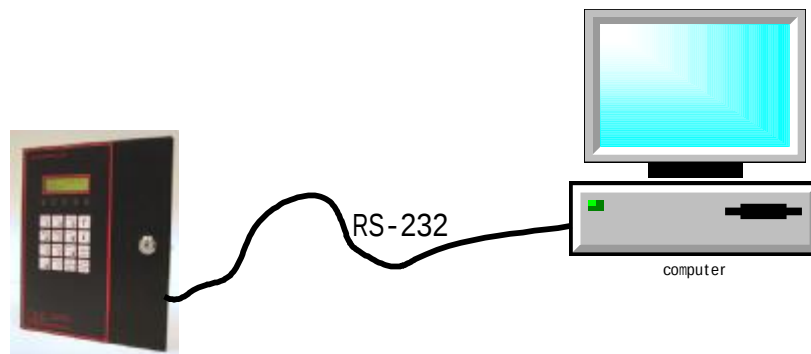
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1 What's M-NET

The M-NET enables communication with serial devices over a LAN or WAN. Serial Devices, such as M-Controller, are no longer limited to a physical connection to the PC COM port. They can be installed anywhere on the LAN using TCP/IP or UDP/IP communications. This allows traditional Windows PC software, such as M-View, access to M-Controller anywhere on the LAN/WAN network.

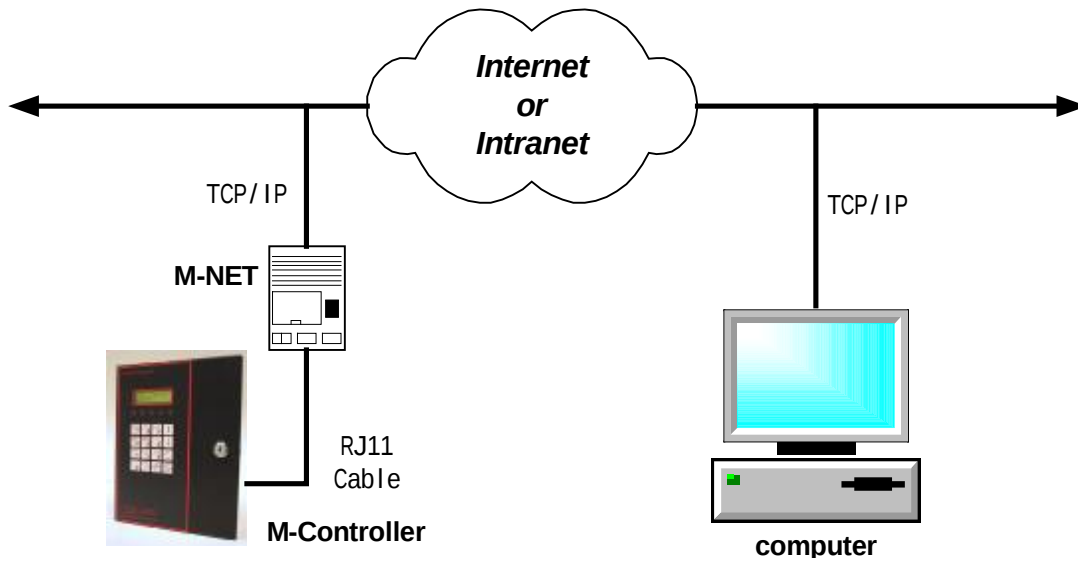
2 Product Concept

In the past, remote management of devices with serial ports was accomplished by running a long serial connection using RS-232 cables. For greater distances, either RS-422 cable was used if the device itself supported this standard, or some type of external converter was installed.



Device Server Technology allows you to take the same device that originally required a direct PC or terminal connection and connect it to any standard Ethernet network. From there, you span out over the Internet or your corporate WAN and share information across your organization.

M-NET is a Device Server that allows you to connect M-Controller directly to any Ethernet network. Use the developed PC software to convert serial commands sent from the M-View via IP that are sent over the network to the M-Controller. From there, the M-NET converts the IP packets back to serial commands and communicates to M-Controller.



3 Package Checklist

- M-NET Ethernet Serial Server
- This Operation Manual
- RJ-45 Cable CAT5 3M (QEL SKU#: 5610-0094)

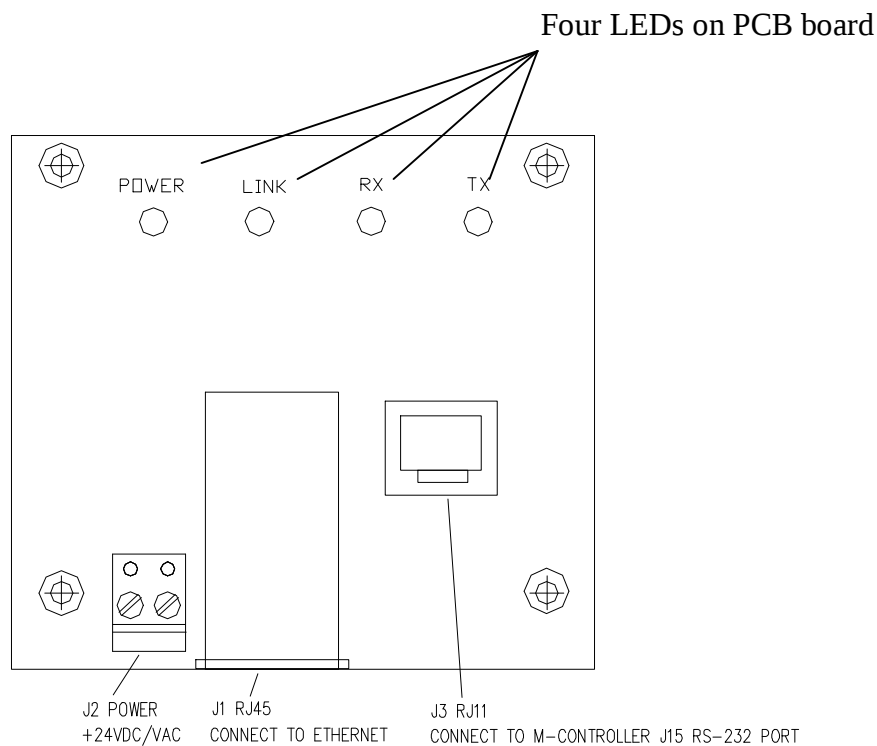
4 M-NET Features

- 10/100 BASE-T Ethernet – Auto-Sensing
- Protocols Supported: ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP and HTTP
- Easy configuration through Ethernet port
- LED Indication for Power, RS-232 Transmit/Receive and Ethernet Status
- Three triggered E-Mails
- Password Protection
- EMI Compliance – complies with EN55024:1998
- Power Supply: +24VDC or 24VAC (non-grounded, floating)
- Extended Operating Temperature –40 to +85 °C
- Designed to meet IP 66 & NEMA 4, 4X, 12 & 13 ratings

5 M-NET Indicators and Connectors

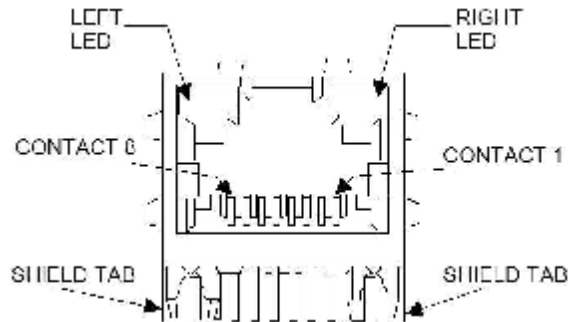
- Four Indicator LEDs on PCB board
- Two Indicator LEDs on RJ-45 connector
- One Ethernet connector (RJ-45 female)
- A Power connector
- A Serial port connector (RJ-11 female)

5.1 LEDs on PCB Board



LED	MEANING
POWER	RED ON: Power is Applied
LINK	RED ON: RS-232 Connection is Good
RX	RED BLINKING: RS-232 Receive Activity
TX	RED BLINKING: RS-232 Transmit Activity

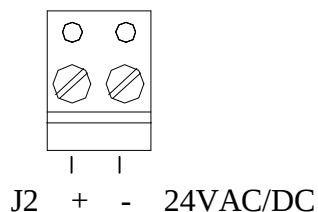
5.2 LEDs on RJ-45 Connector



LEFT LED	RIGHT LED	MEANING
OFF	OFF	No Link
OFF	Solid Amber	100 Base-T half duplex link
OFF	Blinking Amber	100 Base-T half duplex; activity
OFF	Solid Green	100 Base-T full duplex link
OFF	Blinking Green	100 Base-T full duplex; activity
Solid Amber	OFF	10 Base-T half duplex link
Blinking Amber	OFF	10 Base-T half duplex; activity
Solid Green	OFF	10 Base-T full duplex link
Blinking Green	OFF	10 Base-T full duplex; activity

5.3 Connectors

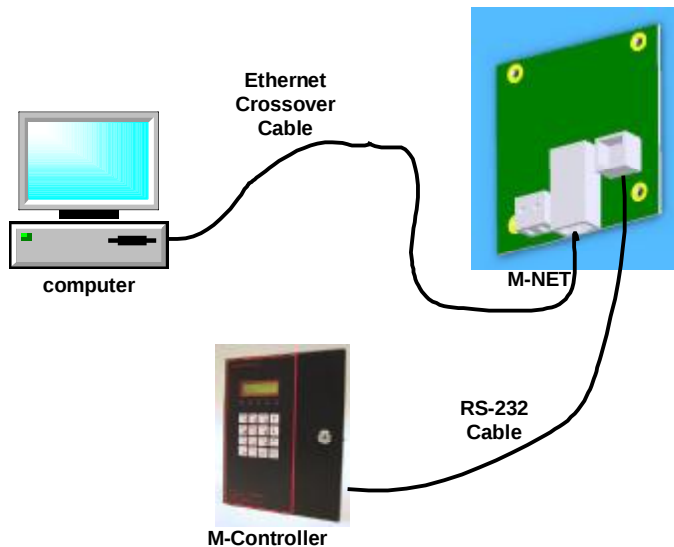
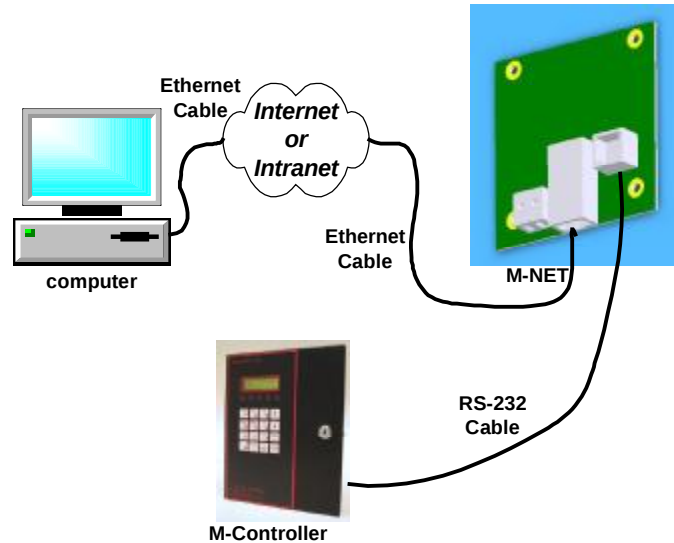
- Ethernet Connector: The M-NET has a standard RJ-45 connector, it can be connected to an Ethernet hub, switch, or wall plate using a standard straight-through RJ-45 (male) Ethernet cable (provided in M-NET package). **To connect directly to an RJ-45 Ethernet port on a PC or laptop, a crossover Ethernet cable must be used.**
- Power Supply Connector: It can be connected to a +24VDC or 24VAC (floating) power supply. Usually, the power is supplied from M-Controller.



- RJ-11 Connector: The port is configured as an RS-232 interface to M-Controller's RS-232 port. When the port is connected to M-Controller using the cable provided in M-Controller's package, the port is configured as a DTE, like a computer.

6 Hardware Installation

- Connect the M-NET to the LAN or to a computer Ethernet port. **To connect directly to an RJ-45 Ethernet port on a PC or laptop, a crossover Ethernet cable must be used.**



- Apply power. The red POWER LED will light. If the Ethernet cable is connected correctly, the LED on RJ-45 Connector will light or flash. If the RS-232 cable is connected correctly, the red LINK LED will light.

7 Required Information

7.1 Hardware Address

You need to know the M-NET's hardware address (also known as MAC address), which is on the product label. It is in the format: 00-20-4a-XX-XX-XX, where the XXs are unique numbers assigned to the product.

Hardware Address: 00-20-4a-____-____-____

7.2 IP Address

Your M-NET must have a unique IP address on your network. The systems administrator generally provides the IP address and corresponding subnet mask and gateway. The IP address must be within a valid range, unique to your network and in the same subnet as your PC.

IP Address: ____ . ____ . ____ . ____

Subnet Mask: ____ . ____ . ____ . ____

Gateway: ____ . ____ . ____ . ____

7.3 Email Server IP Address

M-NET can send an e-mail to multiple recipients when a specific trigger event occurs. There are three separate triggers, based on any combination of the Digital Sensors or Analog Inputs.

Email setup requires you to set up the email server location as follow:

Mail Server	The IP Address in decimal-dot notation. ____ . ____ . ____ . ____
Unit	The user name used by the M-NET to send email messages. _____
Domain	The domain name of your email server. _____
Recipient 1	Full email address of the recipient. _____
Recipient2	Full email address of the second recipient. _____

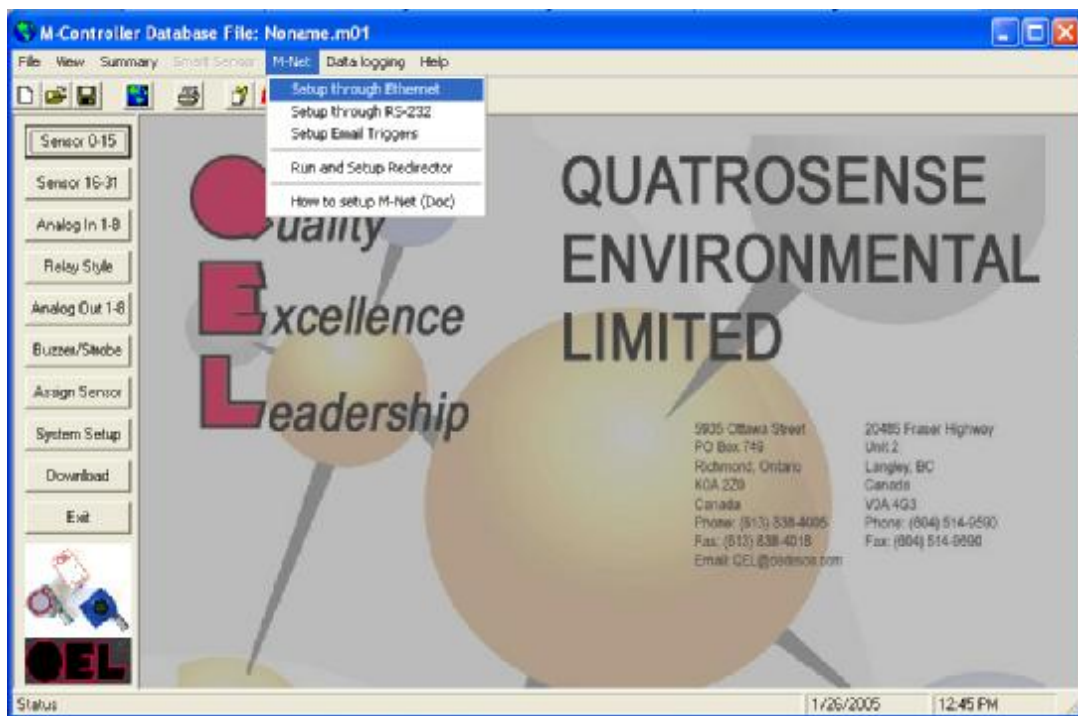
8 Using M-View to setup M-NET

The M-NET's IP address must be configured before it can work correctly on a network. You have two options for assigning an IP to your M-NET. We recommend that you manually assign the IP address over the network using M-View.

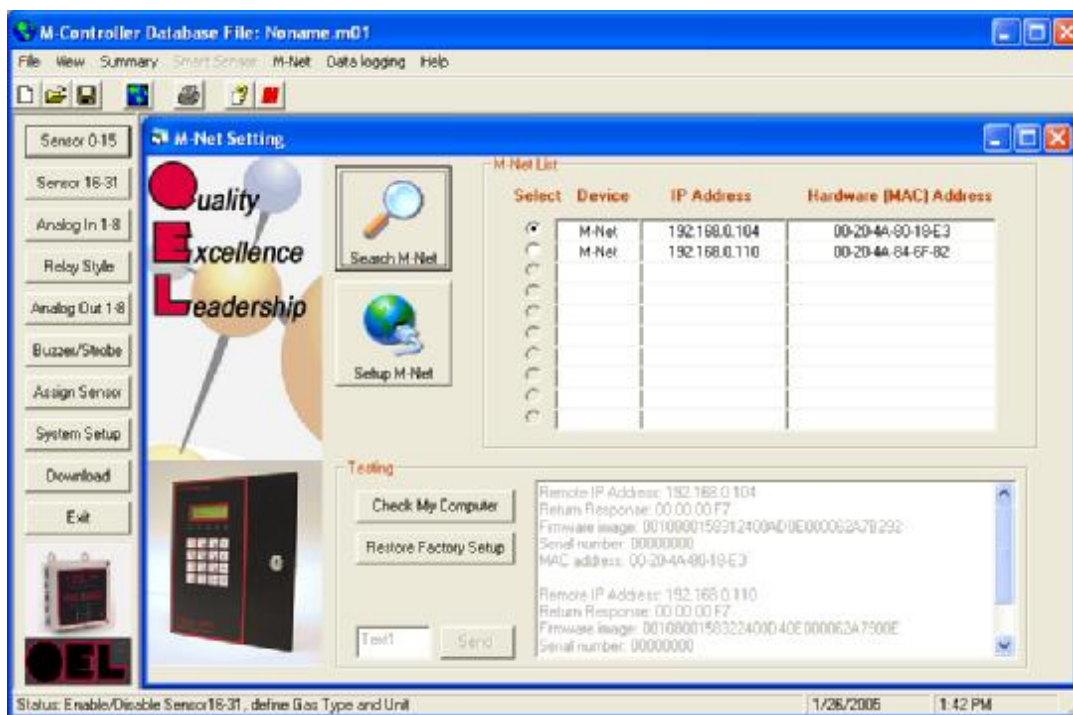
The M-NET's IP address is normally set to 0.0.0.0 at the factory. The hardware address is on the product label. The unit is DHCP enabled as the default.

To manually assign an IP address:

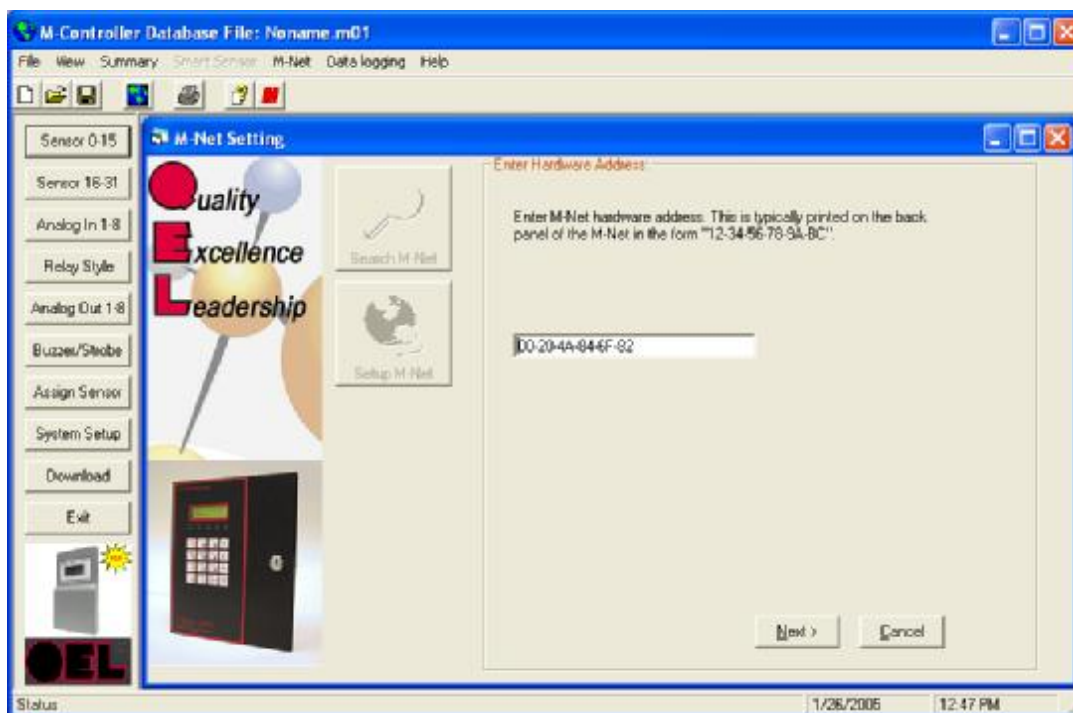
1. Open M-View.
2. Click menu [M-NET] -> [Setup through Ethernet]



3. Click the Search Icon . A list of M-NET on the network displays.

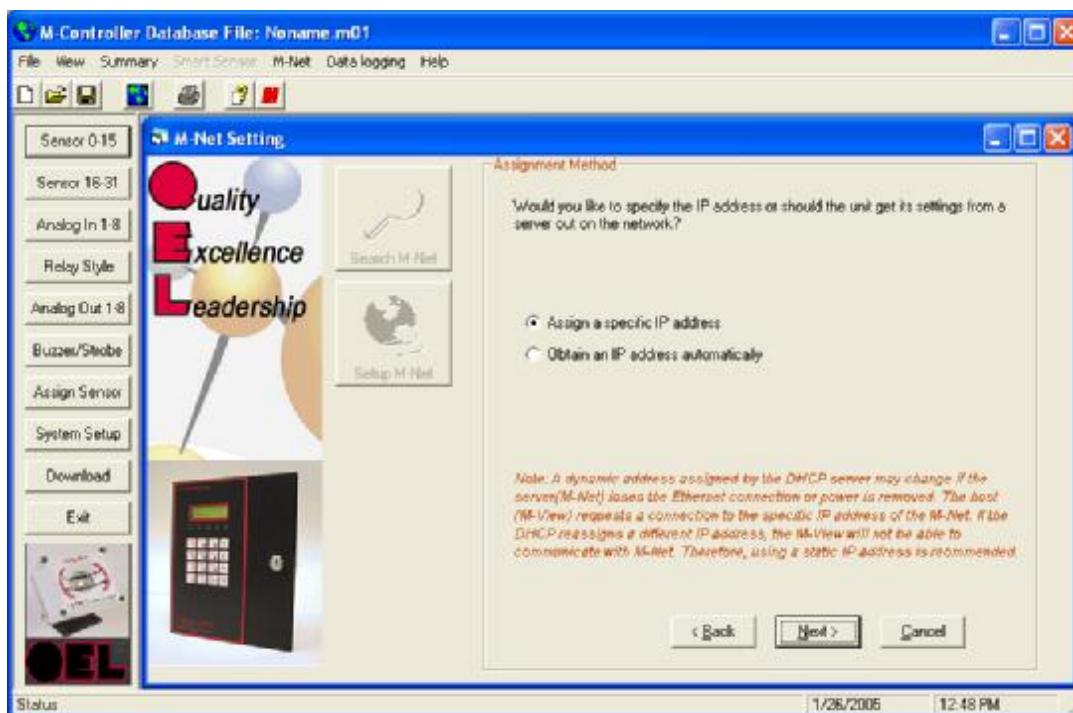


4. Select the unit and click the Setup M-NET icon .
5. Enter or verify the hardware address as it appears on the M-NET and click the [Next] button.



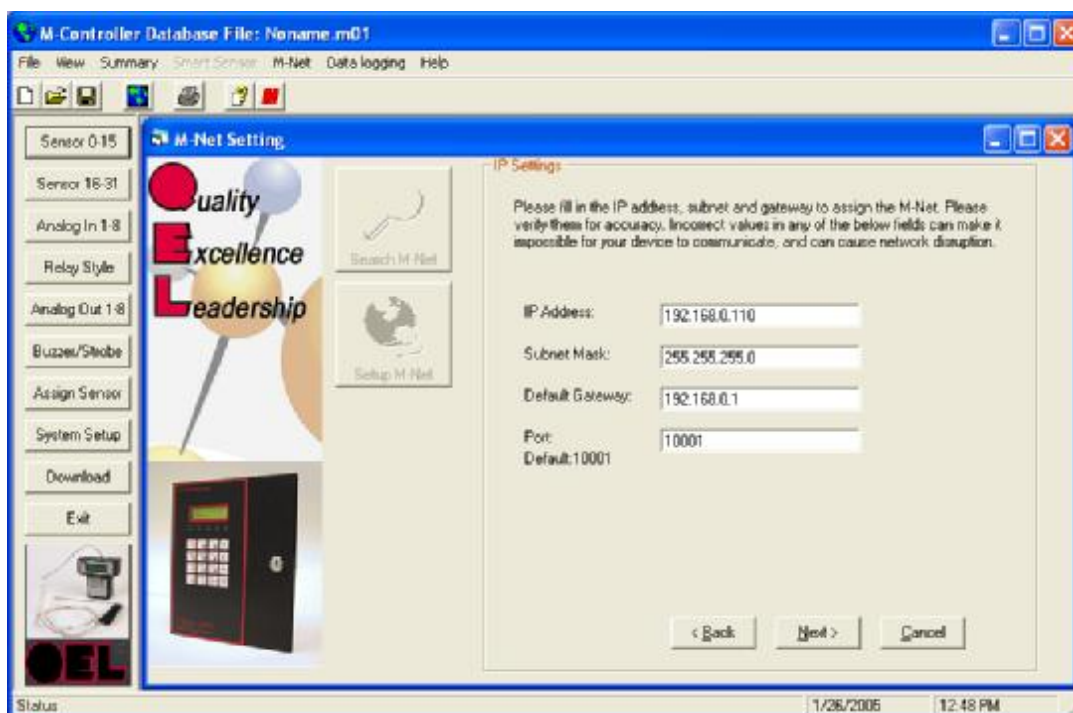
6. In this step, you specify whether you want to get the device to a static IP address or automatically obtain addressing information from the network. We recommend to select “Assign a specific IP address”.

7. Click the [Next] button.

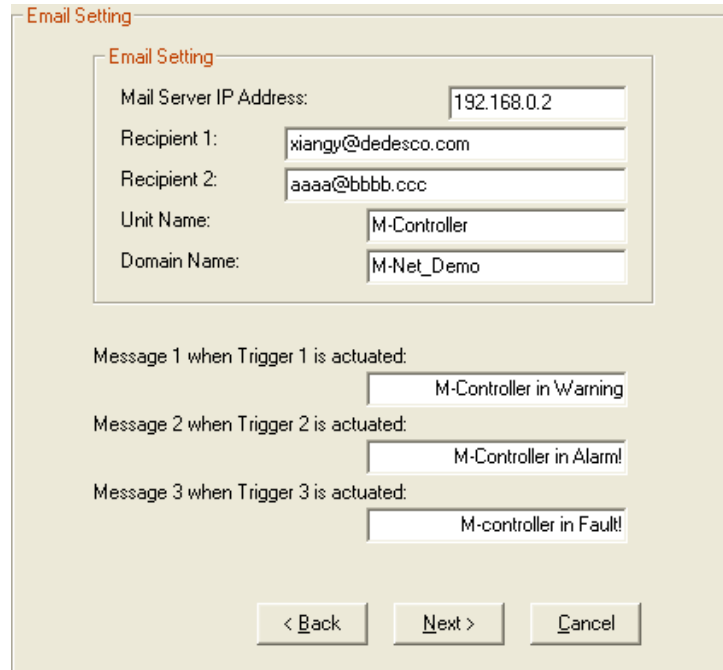


8. In this step, you specify the specific IP address, subnet mask, gateway and port number. The default port number is 10001.

9. Click the [Next] button.



10. In this step, you specify the Mail Server IP Address, Recipient1 email address, Recipient2 email address, Unit Name and Domain Name.
11. You can change the message 1 to 3 according to the triggers you have set.
12. Click the [Next] button.



Email Setting

Mail Server IP Address: 192.168.0.2

Recipient 1: xiangy@dedesco.com

Recipient 2: aaaa@bbbb.ccc

Unit Name: M-Controller

Domain Name: M-Net_Demo

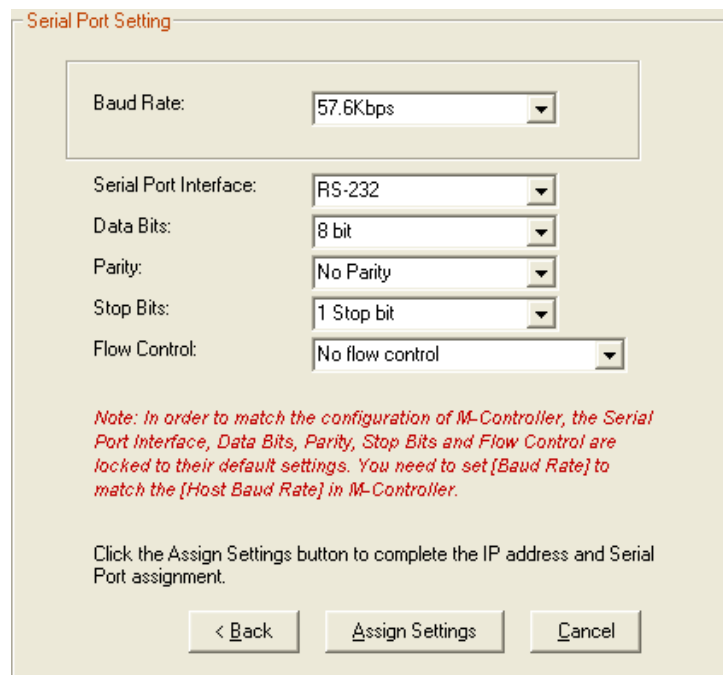
Message 1 when Trigger 1 is actuated: M-Controller in Warning

Message 2 when Trigger 2 is actuated: M-Controller in Alarm!

Message 3 when Trigger 3 is actuated: M-controller in Fault!

< Back Next > Cancel

13. In this step, you can select the baud rate of the M-NET RS-232 port, it should be the same as the Host Baud Rate in M-Controller. Otherwise they are not able to talk to each other.
14. Click the [Assign Settings] button will write all settings to the M-NET.



Serial Port Setting

Baud Rate: 57.6Kbps

Serial Port Interface: RS-232

Data Bits: 8 bit

Parity: No Parity

Stop Bits: 1 Stop bit

Flow Control: No flow control

Note: In order to match the configuration of M-Controller, the Serial Port Interface, Data Bits, Parity, Stop Bits and Flow Control are locked to their default settings. You need to set [Baud Rate] to match the [Host Baud Rate] in M-Controller.

Click the Assign Settings button to complete the IP address and Serial Port assignment.

< Back Assign Settings Cancel

9 Using M-View to open “Comm Port Redirector”

1. Click menu [M-NET] -> [Run and Setup Redirector]

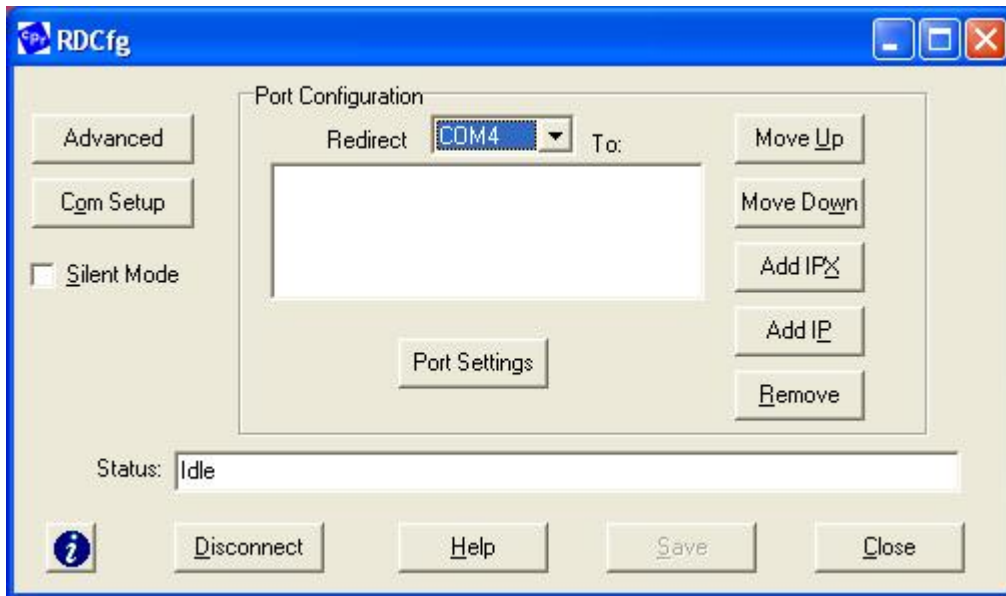


10 How to setup “Comm Port Redirector”

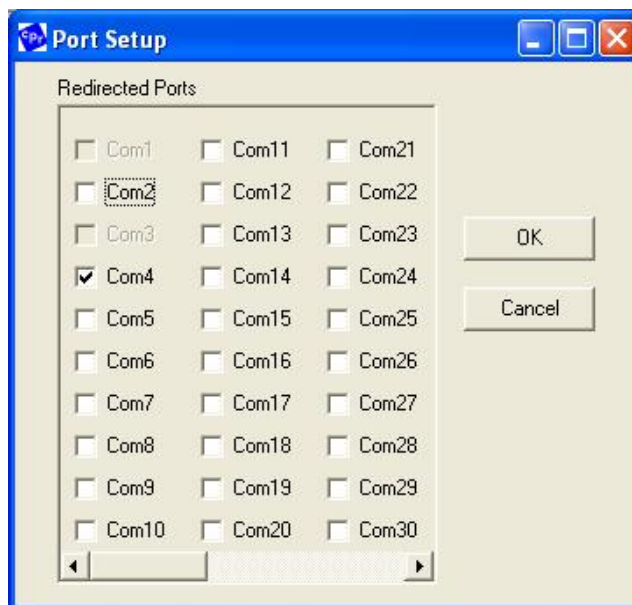
Note:

1. Do not run Com Port Redirector with other software that installs a virtual com port.
2. Do not run Com Port Redirector with other Comm Port Redirection software on the same PC.
3. M-View only detects COM Port 1 to COM Port 6.

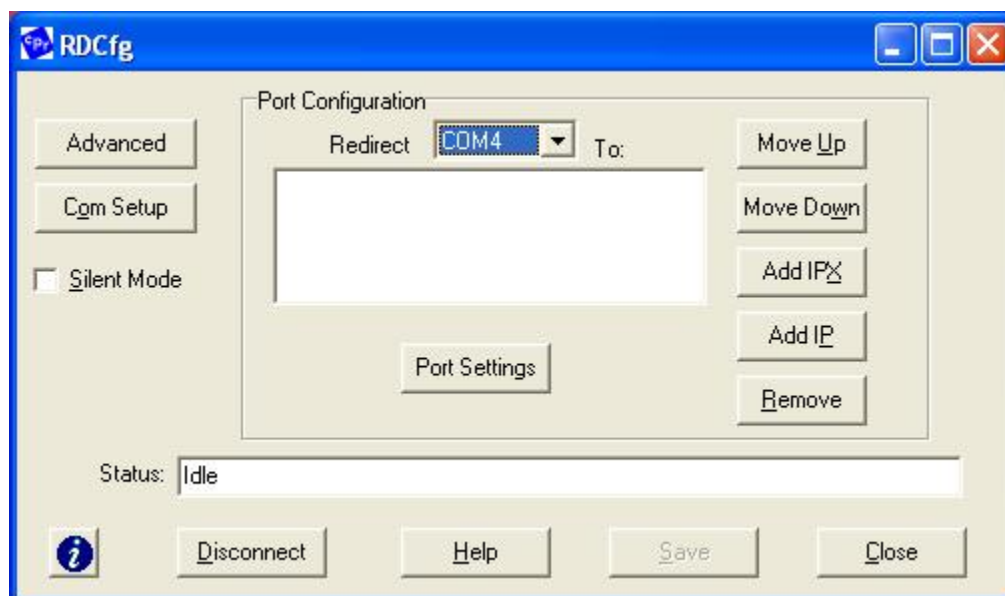
- Open Comm Port Redirector



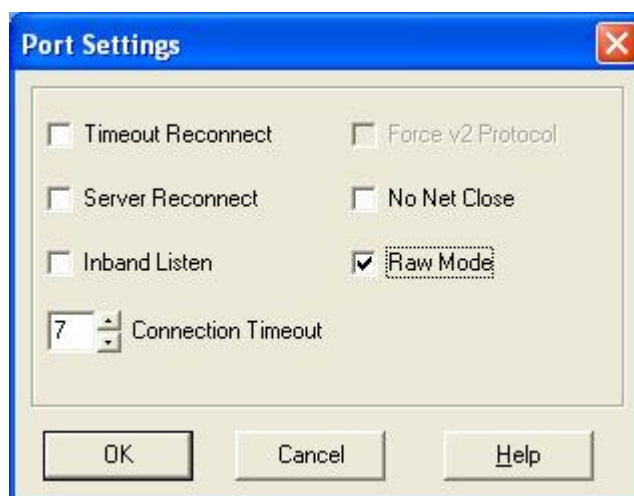
- Click the button [Com Setup]
- Select a COM Port from COM 1 to COM6



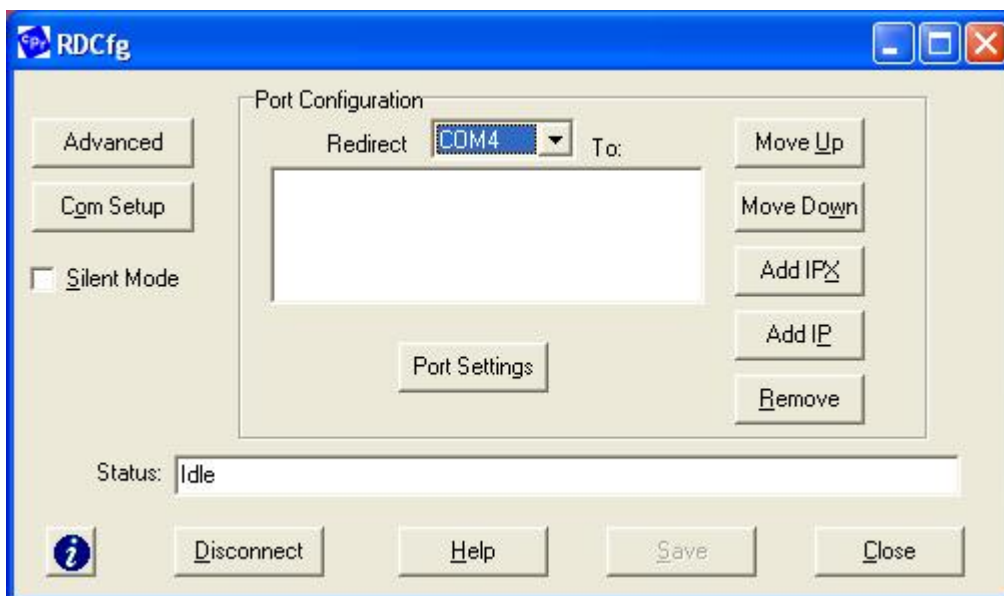
- Click the button [OK], return to main form.



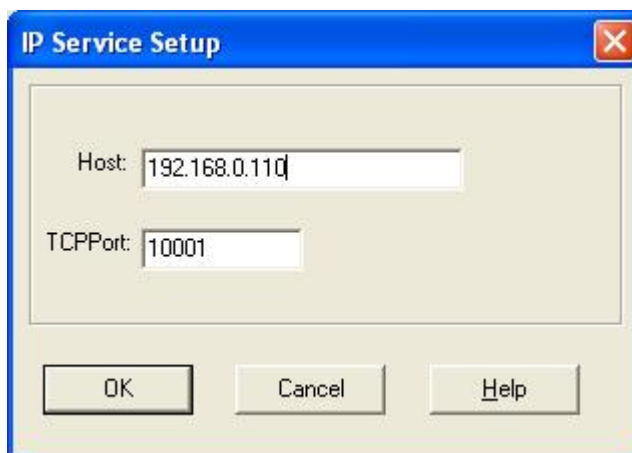
- Click the button [Port Settings]



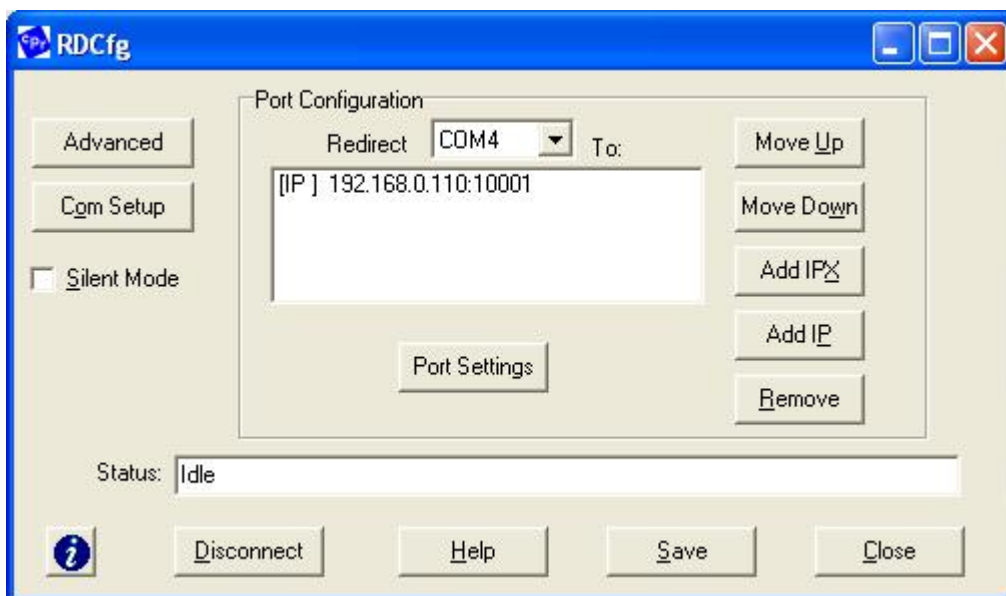
- Check the “Raw Mode”
- Click the button [OK], return to main form



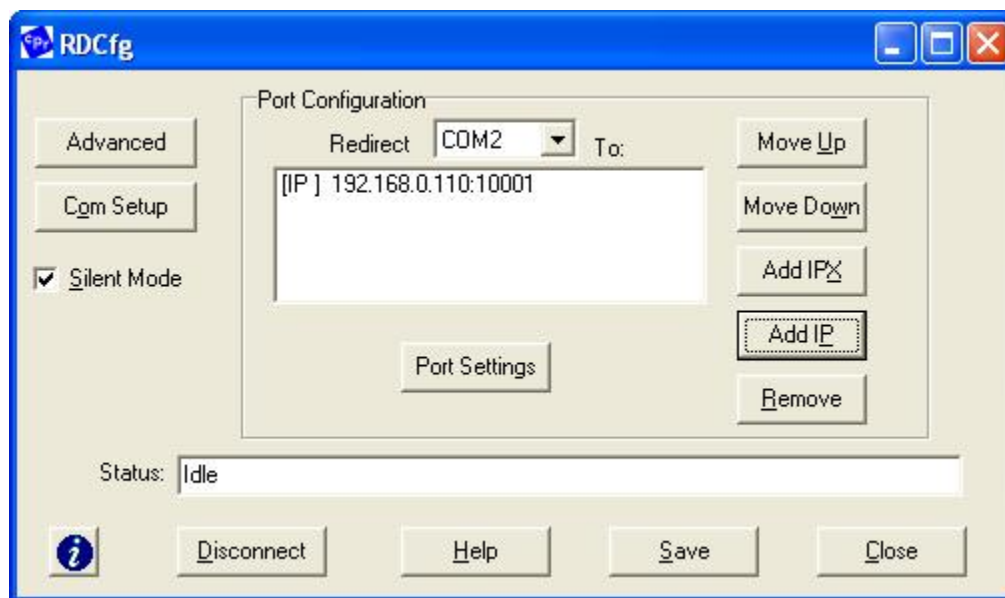
- Click the button [Add IP]
- Input M-NET IP Address which M-View will communicate with and Port Number. The Port Number must be the same as the Port number in the M-NET. Default Port Number in M-NET is 10001.



- Click the button [OK], return to main form



- To hide the pop-up window, check the “Silent Mode” on the Com Port Redirector Configuration window.



- Click the button [Save] to save the settings
- Click the button [Close] to close the program

11 IP Addressing Fundamentals

In order for a network to be useful hosts must have a way of contacting each other. The TCP/IP protocol utilizes multiple layers of addressing to make this possible. It can be broken into four different layers. The physical or hardware layer lies at the base of this protocol "stack". This layer depends upon the actual physical implementation of the network (such as Ethernet or token-ring) and is ultimately responsible for the delivery of network information packets. The IP (Internet Protocol) layer sits above the physical layer in the stack and is independent of the network hardware. Therefore it may encompass many different physical types of networks. The TCP (Transmission Control Protocol) comes next and is independent of both the physical network and the IP layers (although it is most commonly used with IP). The application layer, where a user typically interacts, tops off the stack. The underlying protocols below the application are mostly transparent to the end user. Some applications include FTP (File Transfer Protocol) and Telnet.

Each layer in the protocol stack has its own addressing scheme. The hardware address is used to identify hosts connected to the network. Different physical networks have different forms of addresses that are not compatible with one another. The IP address is also used to identify hosts connected to the network, however it does not rely upon the underlying hardware so it can identify hosts on different physical networks. The TCP port number identifies a particular application on a machine. A packet of information leaves the application layer and enters the TCP layer where a TCP header is added containing the destination and source port number. Then it enters the IP layer which adds an IP header containing a destination and source IP address. Finally the hardware layer adds its header and the appropriate address information. When the packet reaches its destination each layer removes and decodes its header information and then sends the remainder of the packet on until it reaches the destination application.

Consider the following analogy:

Let's suppose that Mike wants to send a letter (*network packet*) to Dave. Mike puts his name (*TCP port number*), return address (*IP address*) and Dave's name (*TCP port number*) and street address (*IP address*) on an envelope and puts the letter inside. If Dave lived close by then Mike might hand deliver the letter, but unfortunately Dave lives far away in the Australian Outback. Mike doesn't know Dave's actual location (*hardware address*) or how to get there, but he does know the street address (*IP address*) and physical location (*hardware address*) of the local post office so he brings it there. When the letter reaches the post office the postman looks at the letter and he doesn't know where this far away place is either, so he puts it in a sack which is placed on a truck (*physical network*) heading toward the main mail depot (*hardware address*) for Mike's area. Once the truck reaches the main depot the letter is sorted and put onto a plane (*physical network*) headed for the Sydney airport (*hardware address*). Then the letter is put on a truck (*physical network*) heading for the post office in the town (*hardware address*) nearest to Dave. When the letter reaches the town the local postman sends the letter out to Dave's house via pony express (*physical network*). The mailman knows Dave's street address (*IP address*) and where it is (*hardware address*) so he can deliver the letter to the house. The next person who looks at the mail sees that the letter is addressed to Dave (*TCP port number*) and delivers it to him.

IP Address

The IP address is usually expressed as four decimal numbers, each representing eight bits, separated by periods. This is sometimes known as the dot address and, more technically, as dotted quad notation. For Class A IP addresses, the numbers would represent "network.local.local.local"; for a Class C IP address, they would represent "network.network.network.local". The number version of the IP address can (and usually is) represented by a name or series of names called the domain name.

The Internet's explosive growth makes it likely that, without some new architecture, the number of possible network addresses using the scheme above would soon be used up (at least, for Class C network addresses). However, a new IP version, IPv6, expands the size of the IP address to 128 bits, which will accommodate a large growth in the number of network addresses. For hosts still using IPv4, the use of subnets in the host or local part of the IP address will help reduce new applications for network numbers. In addition, most sites on today's mostly IPv4 Internet have gotten around the Class C network address limitation by using the Classless Inter-Domain Routing (CIDR) scheme for address notation.

Relationship of the IP Address to the Physical Address

The machine or physical address used within an organization's local area networks may be different than the Internet's IP address. The most typical example is the 48-bit Ethernet address. TCP/IP includes a facility called the Address Resolution Protocol (ARP) that lets the administrator create a table that maps IP addresses to physical addresses. The table is known as the ARP cache.

Static versus Dynamic IP Addresses

The discussion above assumes that IP addresses are assigned on a static basis. In fact, many IP addresses are assigned dynamically from a pool. Many corporate networks and online services economize on the number of IP addresses they use by sharing a pool of IP addresses among a large number of users. If you're an America Online

user, for example, your IP address will vary from one logon session to the next because AOL is assigning it to you from a pool that is much smaller than AOL's base of subscribers.

12 Networking Terms

Auto-Sense

Ability of a 10/100 Ethernet device to interpret the speed or duplex mode of the attached device and to adjust to that rate. Official term is Auto-Negotiation in Clause 28 of the IEEE 802.3u standard.

Baud

Unit of signal frequency | signals per second. Not synonymous with bits per second since signals can represent more than one bit. Baud equals bits per second only when the signal represents a single bit.

Bridge

A networking device that connects two LANs and forwards or filters data packets between them based on their destination addresses. Bridges operate at the data link level (or MAC-layer) of the OSI reference model, and are transparent to protocols and to higher level devices like routers.

Byte

A data unit of eight bits.

Channel

The data path between two nodes.

DHCP (Dynamic Host Configuration Protocol)

Short for Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses.

Ethernet

Ethernet is the most popular physical layer LAN technology in use today. Other LAN types include Token Ring, Fast Ethernet, Fiber Distributed Data Interface (FDDI), Asynchronous Transfer Mode (ATM) and LocalTalk. Ethernet is popular because it strikes a good balance between speed, cost and ease of installation. These benefits, combined with wide acceptance in the computer marketplace and the ability to support virtually all popular network protocols, make Ethernet an ideal networking technology for most computer users today. The Institute for Electrical and Electronic Engineers (IEEE) defines the Ethernet standard as IEEE Standard 802.3. This standard defines rules for configuring an Ethernet network as well as specifying how elements in an Ethernet network interact with one another. By adhering to the IEEE standard, network equipment and network protocols can communicate efficiently.

Hubs/Repeaters

Hubs/repeaters are used to connect together two or more Ethernet segments of any media type. In larger designs, signal quality begins to deteriorate as segments exceed their maximum length. Hubs provide the signal amplification required to allow a segment to be extended a greater distance. A hub takes any incoming signal and repeats it out all ports.

Ethernet hubs are necessary in star topologies such as 10BASE-T. A multi-port twisted pair hub allows several point-to-point segments to be joined into one network. One end of the point-to-point link is attached to the hub and the other is attached to the computer. If the hub is attached to a backbone, then all computers at the end of

the twisted pair segments can communicate with all the hosts on the backbone. The number and type of hubs in any one-collision domain is limited by the Ethernet rules. A very important fact to note about hubs is that they only allow users to share Ethernet. A network of hubs/repeaters is termed a "shared Ethernet," meaning that all members of the network are contending for transmission of data onto a single network (collision domain). This means that individual members of a shared network will only get a percentage of the available network bandwidth. The number and type of hubs in any one collision domain for 10Mbps Ethernet is limited by the following rules:

Internet

The Internet is a system of linked networks that are worldwide in scope and facilitate data communication services such as remote login, file transfer, electronic mail, the World Wide Web and newsgroups. With the meteoric rise in demand for connectivity, the Internet has become a communications highway for millions of users. The Internet was initially restricted to military and academic institutions, but now it is a full-fledged conduit for any and all forms of information and commerce. Internet websites now provide personal, educational, political and economic resources to every corner of the planet.

Intranet

With the advancements made in browser-based software for the Internet, many private organizations are implementing intranets. An intranet is a private network utilizing Internet-type tools, but available only within that organization. For large organizations, an intranet provides an easy access mode to corporate information for employees.

LANs (Local Area Networks)

A network is any collection of independent computers that communicate with one another over a shared network medium. LANs are networks usually confined to a geographic area, such as a single building or a college campus. LANs can be small, linking as few as three computers, but often link hundreds of computers used by thousands of people. The development of standard networking protocols and media has resulted in worldwide proliferation of LANs throughout business and educational organizations.

WANs (Wide Area Networks)

Often a network is located in multiple physical places. Wide area networking combines multiple LANs that are geographically separate. This is accomplished by connecting the different LANs using services such as dedicated leased phone lines, dial-up phone lines (both synchronous and asynchronous), satellite links, and data packet carrier services. Wide area networking can be as simple as a modem and remote access server for employees to dial into, or it can be as complex as hundreds of branch offices globally linked using special routing protocols and filters to minimize the expense of sending data sent over vast distances.

