EME

Excel Medical Electronics, Inc.

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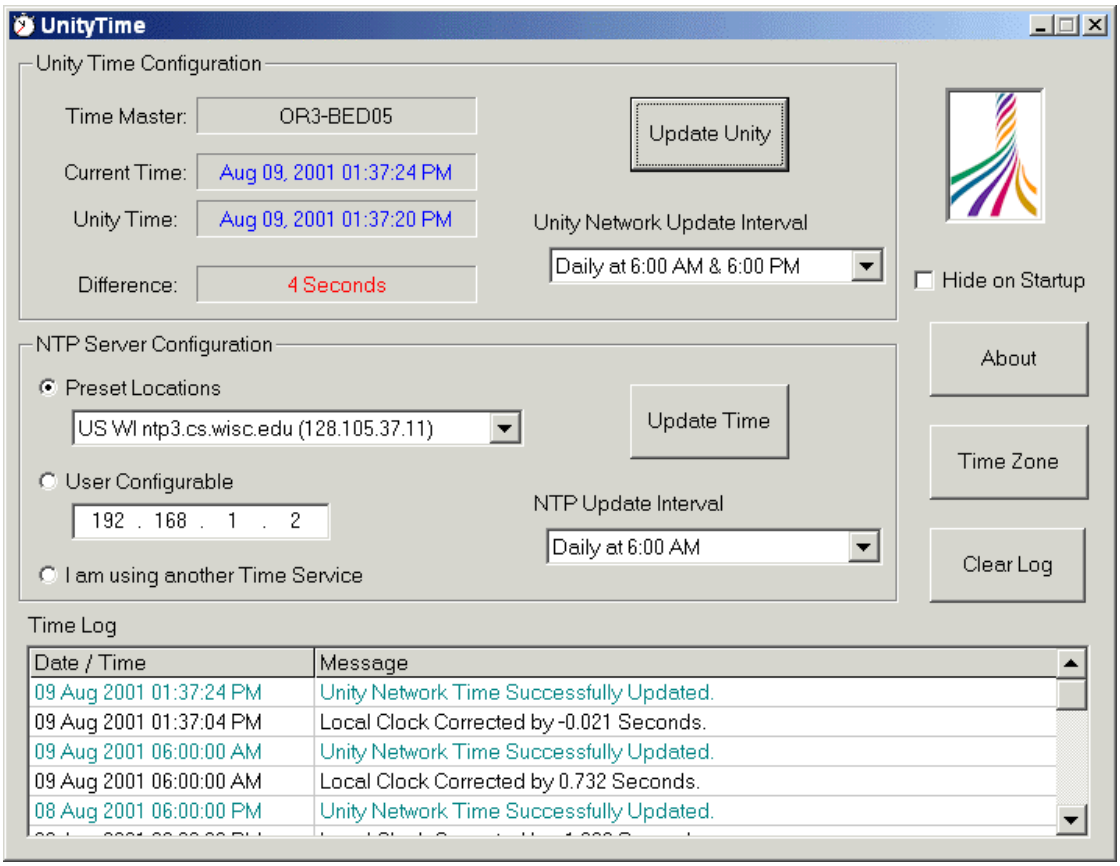
UnityTime Operator's Manual



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1 Introduction

One of the dilemmas clinicians have is the inability to synchronize the time of day within a networked patient monitoring environment. Vendors typically have a proprietary protocol for communication within their own-networked devices in a closed architecture. However, access to this network often requires time-consuming manual tasks using vendor-supplied patient monitoring software.

The UnityTime software program, developed by Excel Medical Electronics, Inc., allows the clinician to access the networked monitoring devices in a GE Medical Systems Information Technologies Unity Network. With its ease of use and common controls of the Microsoft Windows operating system, UnityTime allows the user to synchronize the time on the Unity Network.

A unique feature is that the Unity Network is built with industry-standard equipment and IEEE 802.3 (Ethernet) cabling. This means that standard personal computers can be used with off-the-shelf hardware already familiar to hospital networking specialists.

Industry standard communication protocols are applied throughout UnityTime, as well. The Unity Network uses protocols from the TCP/IP family, which is the same protocol family that connects millions of computers across the Internet and is most often used to connect multi-vendor networks. This industry standard approach allows the Unity Network to contain networks of patient monitors, printers, central stations, etc. UnityTime employs this open architecture to synchronize the time on the patient monitoring devices on the Unity Network.

2 Theory of Operation

UnityTime is a stand-alone program that runs under Microsoft Windows 95/98/Me/NT/2000 operating systems. The personal computer executing UnityTime must have a network interface to an Ethernet LAN and have the TCP/IP stack loaded. The personal computer executing UnityTime must also have a second network card with access to the Internet to fully utilize all the program's features. One of the network cards must have the same base IP address as the GE Medical Systems Information Technologies Unity Network connection. For example, if the Unity Network has a base IP address of 126.x.x.x, the UnityTime personal computer must also have the IP address set to a unique IP using 126.x.x.x.

After initialization, UnityTime uses a main dialog screen to display the system time of the personal computer executing UnityTime and the time of the Unity Network's Time Master. UnityTime will then wait until the configured interval time arrives before proceeding to update the UnityTime's personal computer time and/or the time on all of the Unity Network devices.

The time on the UnityTime's personal computer can be configured to use a Network Time Protocol (NTP) server to update its own system clock. NTP is a protocol that accurately synchronizes the time on computers around the world.

3 Installing UnityTime

UnityTime uses a setup program for easy installing. After installation, UnityTime will be located under Start->Programs->UnityTime.

Three directories are created on the C:\ drive with the installation process. The first is BedMaster. Under this main directory are two subdirectories, Bin and Data. The Bin directory contains the UnityTime executable file, as well as the UnityTime operator's Manual (in PDF format). Double-clicking UnityTime.exe will also invoke the program. The data directory stores all information logged by UnityTime.

4 Setting Up the UnityTime Network

To run UnityTime, the personal computer must contain an Ethernet network adapter and the TCP/IP protocol stack to communicate on the Unity Network.

The IP address of the personal computer *must* also be set to the same subnet and mask as the Unity Network.

Important: Failure to configure the network properly will inhibit use of UnityTime.

It is recommended that the installer consult with the Unity Network Administrator and have the administrator assign a unique IP address for the personal computer running UnityTime.

Unity Networks are usually set up using the subnet of 126.0.X.X and a network mask of 255.0.0.0. One way to verify this is to look at a patient monitor connected to the Unity Network. Under Monitor Setup, there is a selection called Service Mode. Under Service Mode there is a selection called Set Internet Address. Entering this, the Internet address will be displayed. Do not modify this address. Note the four numbers separated by periods. This is the address of the patient monitoring device on the Unity Network. The UnityTime computer must be configured to an IP address not used by any other device on the network.

To set up the network address under Microsoft Windows, select <Settings> from the <Start> button. Double-click the Network icon.

If the network adapter is already installed, a network dialog box will appear listing all the personal computer network settings.

Select the network adapter to be connected to the Unity Network. Note that this adapter must be “bound” to the TCP/IP protocol. Click the <Properties> button to configure the network card. See Figure 4-1, Network Setup, for details.

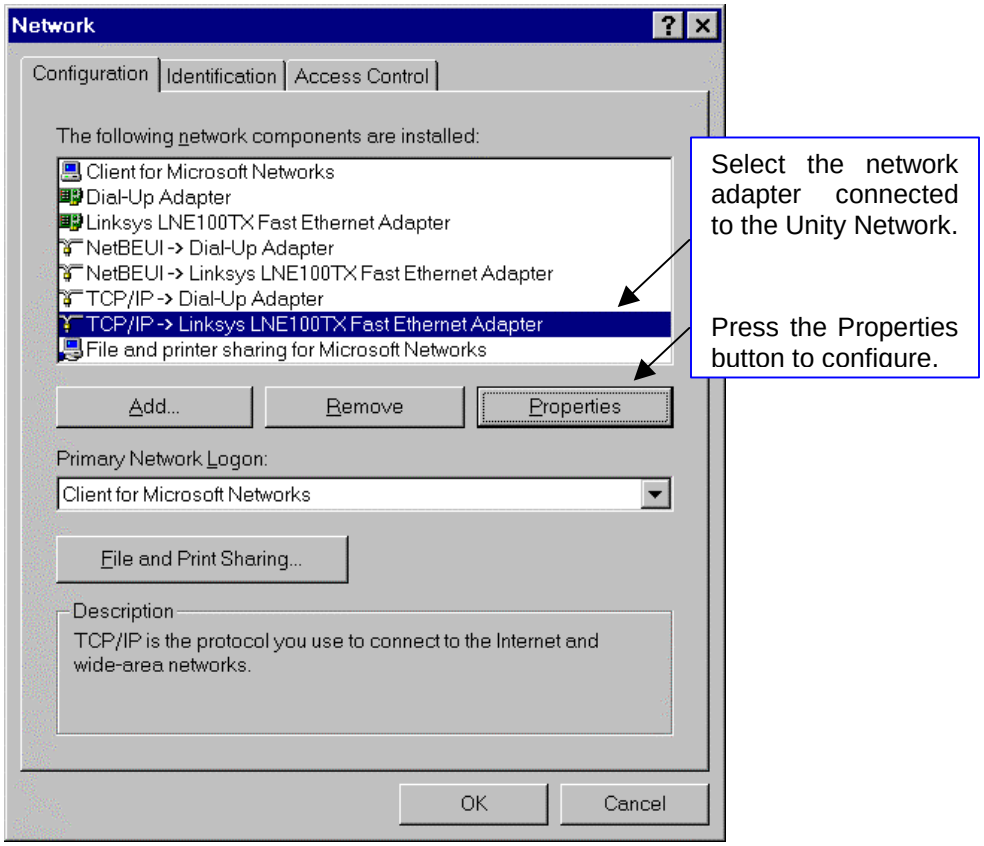

Figure 4-1: Network Setup

Figure 4-2 illustrates the TCP/IP properties screen. An IP address must be specified, as the Unity Network does not use DHCP servers. Again, it is recommended that the installer consult the Unity Network Administrator before assigning an IP address. This address *must* be unique for UnityTime to operate properly. Also note the Subnet Mask of 255.0.0.0.

After the data has been entered, press <OK> to continue. A prompt will show to reboot the personal computer if any changes were made to the settings.

To install the personal computer onto the Unity Network subnet, a network cable should be used to connect the personal computer to the Unity Network hub. The Unity Network Administrator can provide the location of the network hub.

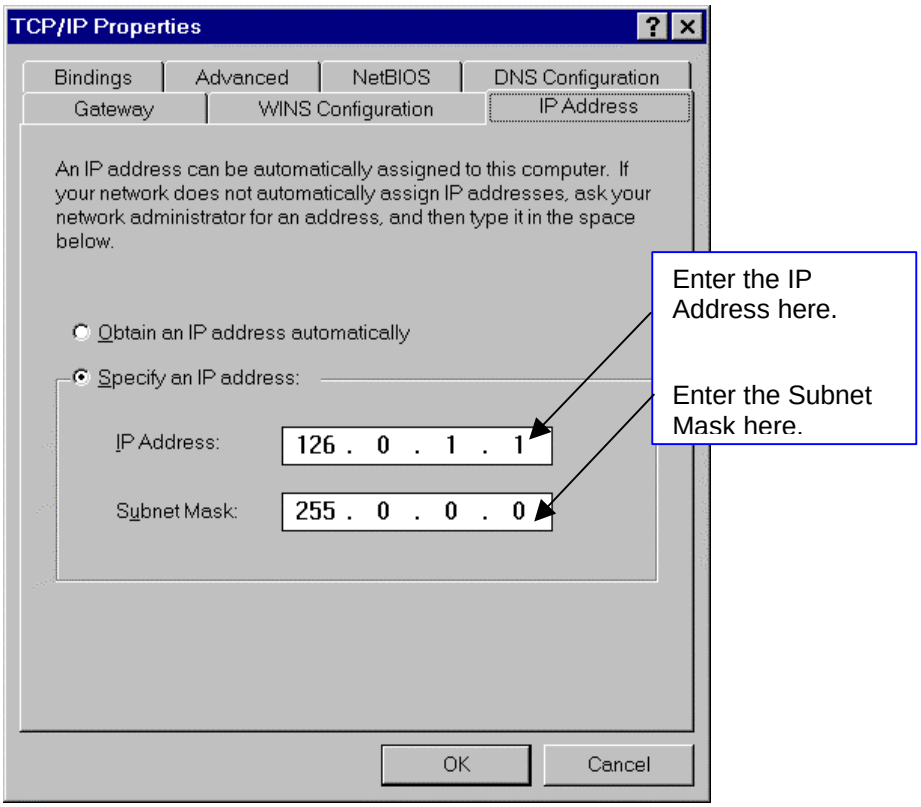

Figure 4-2: TCP/IP Properties

5 Setting Up UnityTime

After the UnityTime program has been installed and the personal computer network has been configured and connected, Unity Network's Time Master should now be viewable.

UnityTime will automatically start and initialize each time the computer boots up (see Figure 5-1). If UnityTime does not properly initialize the network, the Time Master field will remain blank.

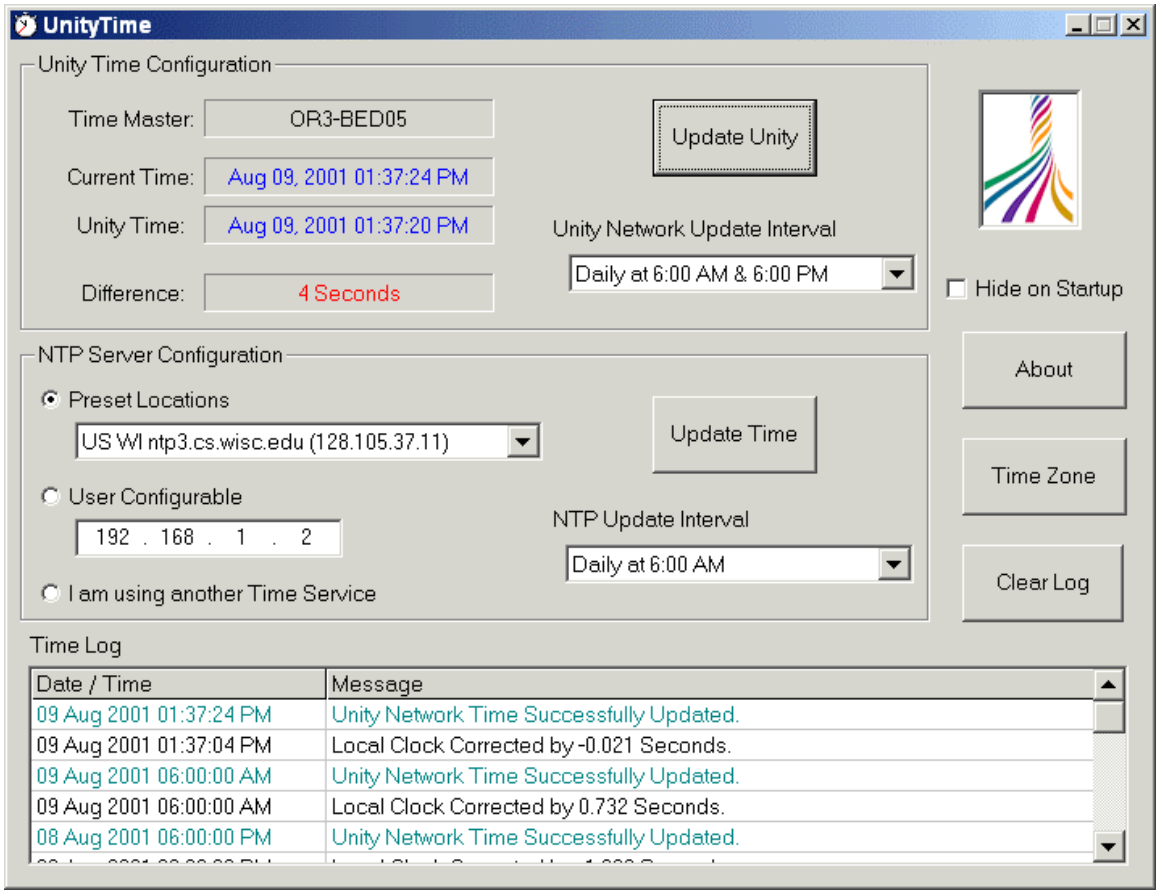

Figure 5-1: UnityTime Screen

5.1 Configuring the Time-Server

The middle portion of the UnityTime screen allows for the configuration of the NTP server. There are three options on synchronizing the UnityTime computer's system clock: 1) Allows the selection of one of the preset NTP server locations; 2) Permits manual configuration of the time-server by setting its IP address; 3) Allows UnityTime to update the computer's system clock to be disabled.

UnityTime supplies eight preset highly reliable NTP servers. One of these preset servers can be selected by simply selecting the Preset Locations radio button and selecting one of the eight NTP servers, as shown in Figure 5-2. Once the NTP server is selected, UnityTime will automatically synchronize the computer's clock with the NTP server.

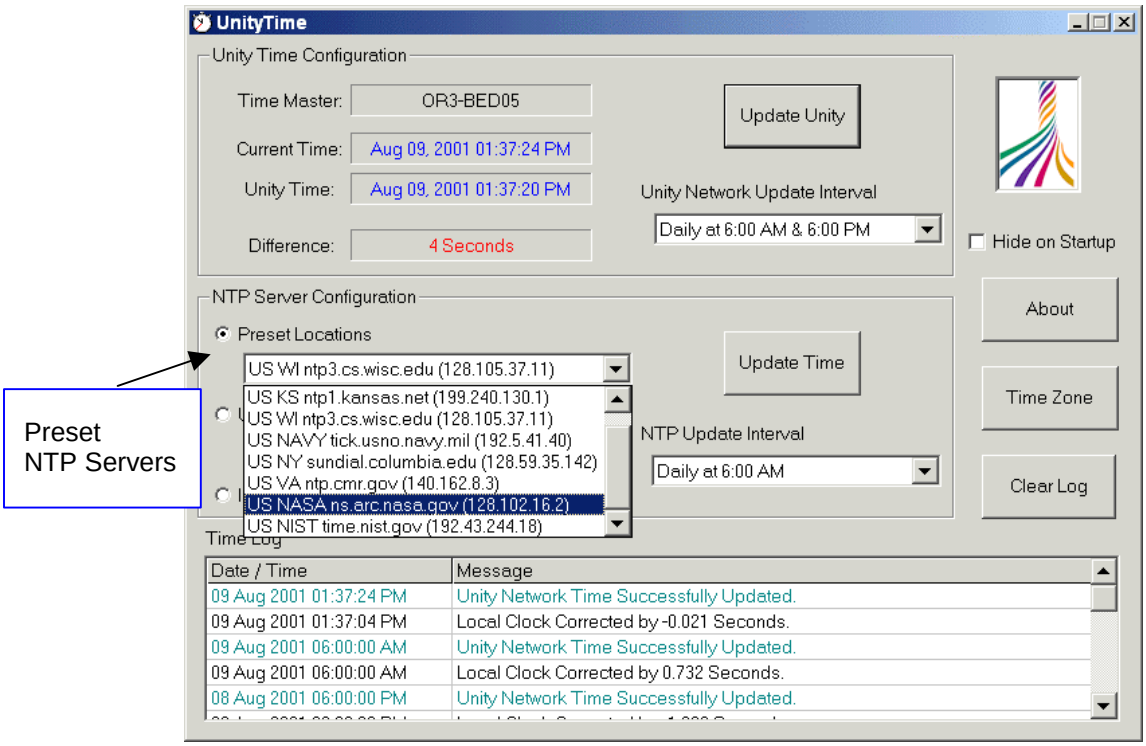

Figure 5-2: Preset NTP Servers

Because there are over 175,000 NTP servers on the Internet, UnityTime allows a user configurable time-server, which can be one of the thousands of NTP servers on the Internet or any other time service, such as the Windows Time Service that comes with Windows 2000. To use this option, select the <User Configurable> radio button and then enter the IP address of the time service computer (see Figure 5-3).

If updating the computer's system clock is not desired, select the <I am using another Time Service> radio button. As long as this option is selected, UnityTime will not update the computer's system clock.

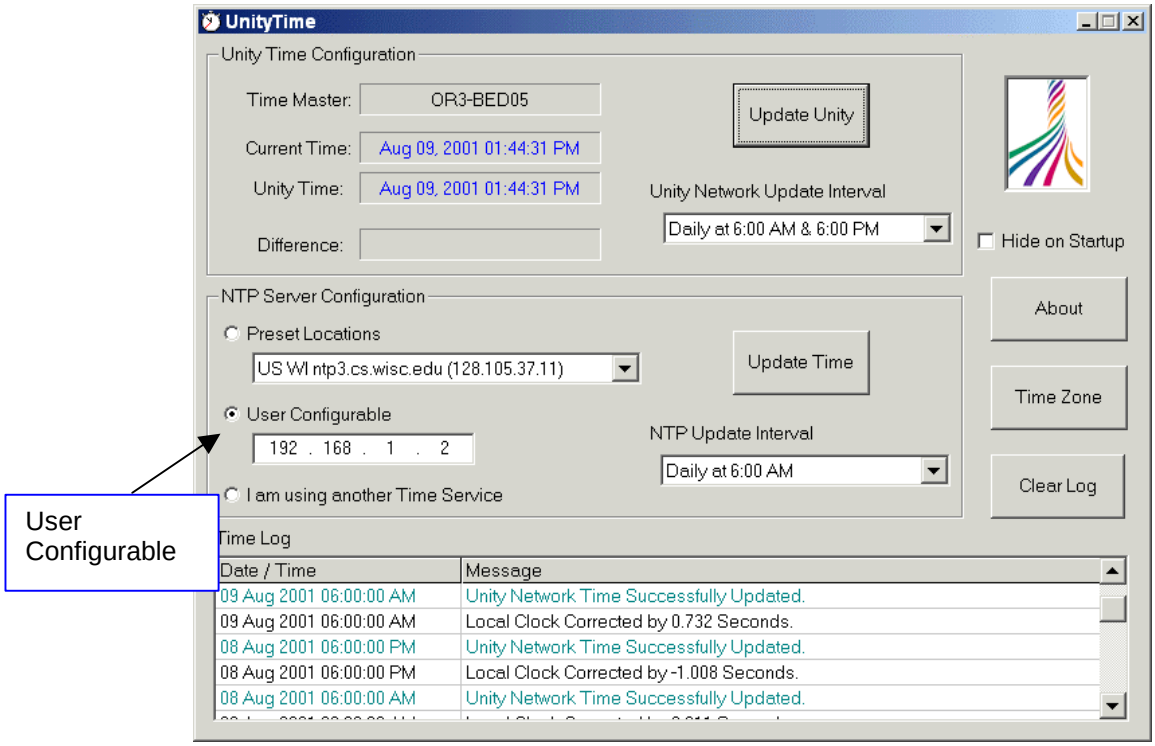

Figure 5-3: User Configurable

5.2 Setting Up the System Clock

Because most time-servers use the Universal Time Coordinated (UTC) as the official standard for the current time, UnityTime will make adjustments for the current time zone, as well as Daylight Savings Time. It is important that this be set properly on the UnityTime computer. To make it easy to check and set the computer's time zone, UnityTime supplies a <Time Zone> button. This button displays the Date/Time Properties window, as shown in Figure 5-4.

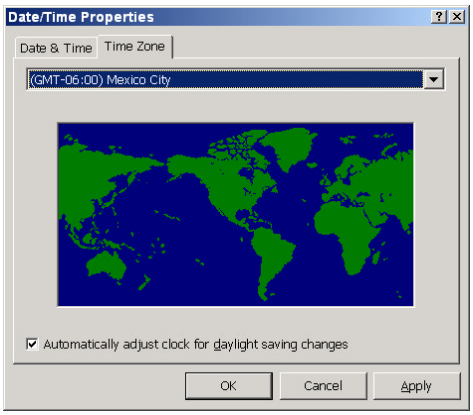

Figure 5-4: Time Zone Setting

5.3 Update Interval

To configure how often UnityTime updates its system clock, use the NTP Update Interval option shown in Figure 5-5, and choose the appropriate update interval. Selecting <On Demand> will update the system clock only when the <Update Time> or <Update Unity> button is pressed. If one of the other two options is selected, UnityTime will automatically update its system clock at the selected time of day.

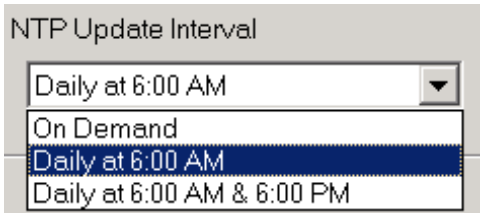

Figure 5-5: NTP Update Interval

To configure how often UnityTime updates the time of the Unity Network devices, use the Unity Network Update Interval option shown in Figure 5-6, and choose the appropriate update interval. Selecting <On Demand> will update the Unity Network devices only when the <Update Unity> button is pressed. If one of the other two options is selected, UnityTime will automatically update the Unity Network devices at the selected time of day.

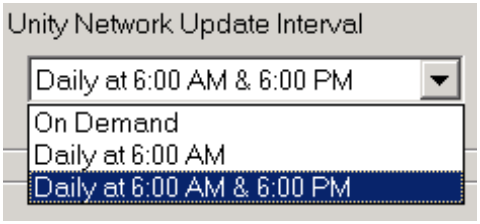

Figure 5-6: Unity Network Update Interval

Whenever the NTP Update Interval and the Unity Network Update Interval are set to occur at the same time, the NTP update will be performed before the Unity Network update.

5.4 UnityTime Status

The top of the UnityTime screen contains the status area shown in Figure 5-7, which provides information on the Unity Network and the time synchronization status. The first line in the status area is the name of the Unity Network device that is acting as the Time Master. The second line is the UnityTime's computer clock. The next line is the time of the Unity Network's Time Master, and the last line in the status area is the difference between the two clocks.

Figure 5-7: Status Area

The status area may display information that is not anticipated. When the UnityTime computer is not connected to the Unity Network, the Time Master field will be blank and the Unity Time field will contain dashes. When the UnityTime computer and the Unity Network are synchronized to within three seconds, the Difference field will be blank.

5.5 Manual Update

UnityTime provides two buttons for manually updating the various features of the program.

The <Update Time> button updates UnityTime's system clock before updating the status area of the screen.

The <Update Unity> button updates the time of the Unity Network devices, performs an update of the system clock, and then updates the status area of the screen.

5.6 Time Log

All of the activity performed by UnityTime is logged. The Time Log is displayed at the bottom of the UnityTime screen and can be referenced to determine if the UnityTime program is properly configured. The Time Log also displays status information and error messages. Status information is displayed whenever UnityTime accesses a NTP time-server or updates the time of the Unity Network devices. Error messages displayed in the log can be used to aid in the proper configuration of UnityTime. Selecting the <Clear Log> button will remove all the entries in the Time Log.

6 Error Messages

Besides displaying status information, UnityTime logs error messages to the Time Log. Error messages are primarily network error messages from improper or missing network software components and file error messages opening or writing to the log file. Since all networking is done using TCP/IP and UDP protocols, data is guaranteed to arrive correctly, thereby minimizing errors.

Error messages may include:

- No Unity Time Master Available.
- No Response From Unity Time Master.
- Unity Network Update Error 254.
- Network error 2103 trying to reach NTP Server (192.240.130.2.)
- No Time Service Selected.
- Invalid Time Service IP Selected.
- Can't Create Time Socket!
- Receive From failed: error code 1025.

One of the most common error messages is the network error shown in Figure 6-1. This error is displayed when the selected NTP server is not properly configured. To eliminate this error, the selected time service program needs to be repaired or another NTP service needs to be selected.

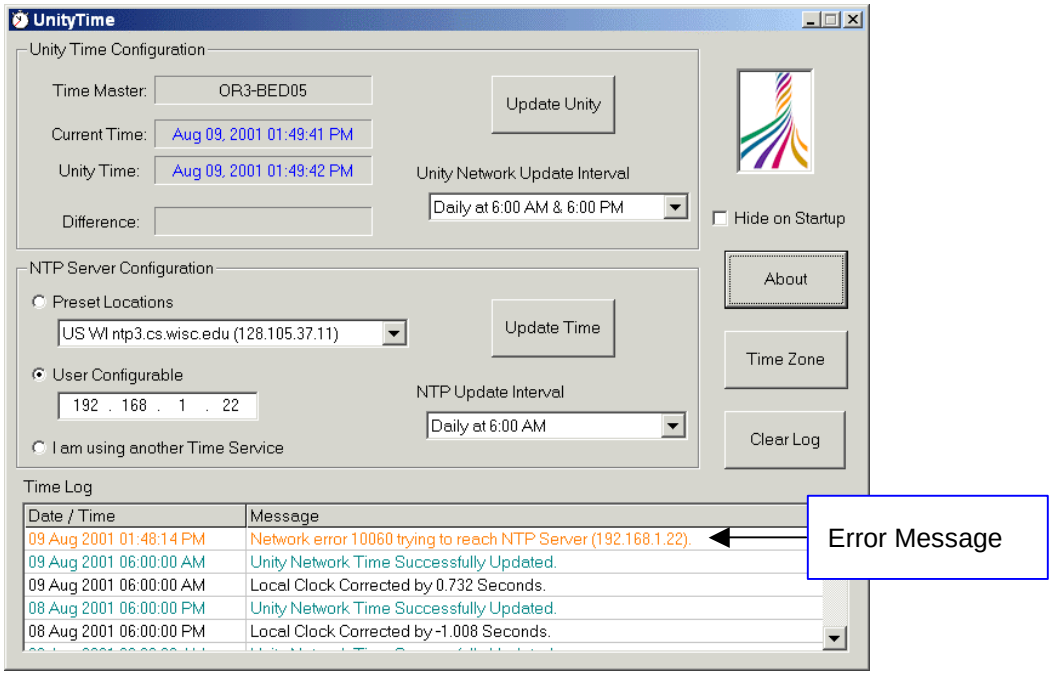

Figure 6-1: Network Error

Another type of error message is a file access error. If UnityTime cannot properly open the Time Log file, the error shown in Figure 6-2 will be displayed. This error is displayed when the file properties or security permissions for the file are not properly set. To eliminate this error, use Windows Explorer to set the file's properties

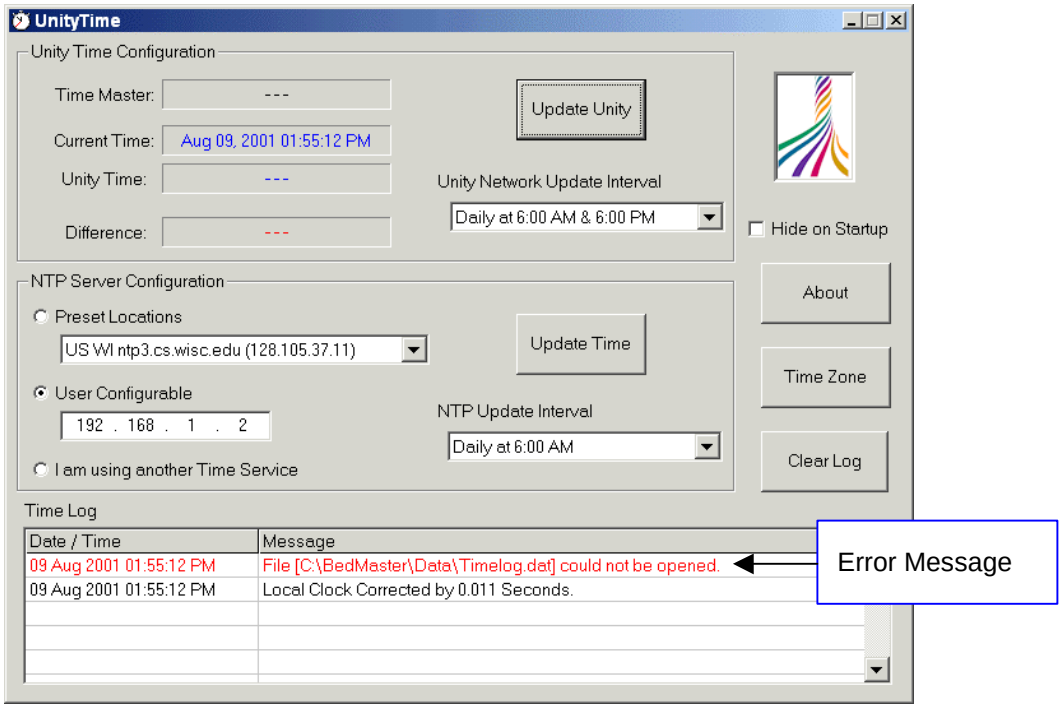

Figure 6-2: File Error

Another common error message is due to improper connection to the Unity Network. If UnityTime cannot properly connect to the Unity Network, the error shown in Figure 6-3 will be displayed. This error is displayed when UnityTime's computer is not on the same subnet. See the *UnityTime Network Setup* section for information on how to eliminate this error.

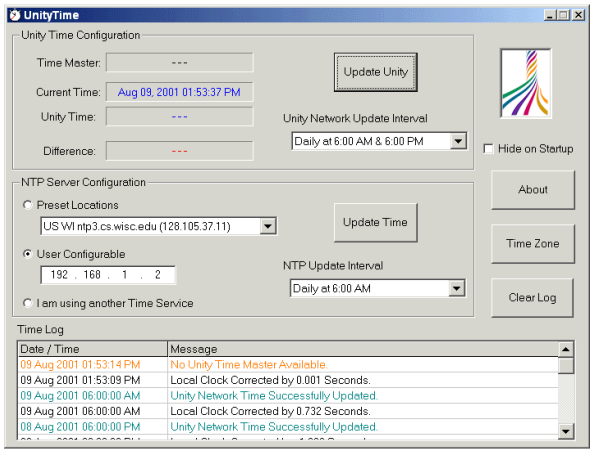

Figure 6-3: No Unity Time Master Available

7 Customer Service

Customer Service and Technical Support personnel are available for assistance at:

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Fax: (954) 212-8148

http://www.excel-medical.com

Additional information about UnityTime and how to reach Excel Medical Electronics can be found in the About box, as shown in Figure 7-1.

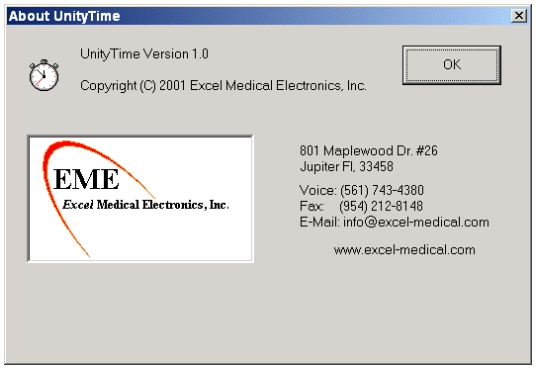

Figure 7-1: About

8 System Requirements

The following are the recommended minimum requirements for the UnityTime program.

- Windows 95/98/Me/NT/2000 operating system
- 133 MHz Pentium® class processor
- 100 MB free hard drive space
- 32 MB RAM
- Network card (two network cards are recommended)

9 Evaluation Versions

Evaluation versions of UnityTime are fully functional programs except that the Unity Network time will only run for five days after installation. All other features are available to give the operator a full evaluation of the UnityTime program.