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Inova OnTime® Clock Installation and User Guide

Firmware version 1

Inova OnTime Clock

Installation and User Guide

Firmware Version 1

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Part Number: 715412

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1. OnTime Introduction

The Inova OnTime® Clock brings all the advantages of Power over Ethernet (PoE) technology to the marketplace in a real-time synchronized system of clocks.

PoE is an exciting and relatively new technology that allows devices to get both power and data over standard network cabling. It is the same technology that powers Voice over Internet Protocol (VoIP) phones.

Delivering both data and power over one set of wires simplifies installation, saves space, and eliminates the need for electrical outlets at the clock mounting locations. Additionally, the option of centralized Uninterrupted Power Supply (UPS) backup allows PoE devices to continue running even in the event of a power failure.

Note: The local area network must support IEEE 802.3af PoE for the OnTime Clocks to operate.

This document contains:

- Safety Instructions
- Technical Specifications
- Installation Instructions
- Configuration Procedures
- Troubleshooting Solutions
- Maintenance/Warranty

Novanex maintains a support website for registered customers at support.novanexsolutions.com. This website contains:

- Frequently asked questions
- Support information
- Access to the OnTime Management System that can be used to manage your clock system

1.1. Clock Identification

This manual applies only to the firmware version 1 of the OnTime Clock, produced from 2005 to mid-2015. Refer to the table below to determine which model you have. If you believe that you have an OnTime Clock Firmware Version 2, please refer to the support site for the version 2 manual.

	Firmware Version 2	Firmware Version 1
Production Years	Mid-2015 to present	2005 to mid-2015
Firmware Versions	2.x	1.x
Organizationally Unique Identifier (OUI), or MAC Address Prefix	00-30-D1	00-60-35
Digital Clock Identification	Observe the firmware version on a reboot or power cycle and look for firmware version 2.x	Observe the firmware version on a reboot or power cycle and look for firmware version 1.x
Analog Identification	No LED Digits on the Rear	Look for LED Digits on the rear, which indicate a firmware version 1 clock

2. Safety Instructions

Read and understand all instructions before installing or operating an OnTime Clock. This product is safe when installed and operated as described in this user guide.

- To prevent injury, damage to the unit, or other harm, read this manual in its entirety before installing or operating the clock.

- Observe normal safety precautions and use appropriate safety equipment (safety glasses, gloves, ladders, etc.) when installing this product.

- Never install wiring during a lightning storm.

- Never install data jacks or electrical wiring in wet locations unless the equipment is specifically designed for that purpose.

- Be sure that mounting hardware is suitable for the mounting surface and sufficient to support the weight of the clock.

- Observe all local codes when installing the product.

- This product is not a toy! Please keep it out of the reach of children.

- Operation of this product in a manner inconsistent with the instructions in this manual may result in personal injury and damage to the product and will void the warranty.

- Do not use harsh cleaners or aerosol cleaners. Use a damp cloth for cleaning.

- Do not place this product on an unstable cart, stand, or table. The product may fall, causing injury or damage.

- This product is not approved for damp or wet locations; it is certified for dry, indoor installation

3. Technical Specifications

The OnTime Clock is available in three models with the specifications listed in Table 1.

Technical Specifications			
	Analog	**Digital (hh:mm)**	**Digital (hh:mm:ss)**
Display Face	Analog Clock Dial 12" (30 cm)	4-Digit Red or green 7-segment LED	6-Digit Red or green 7-segment LED
Viewing Distance	100 feet	150 feet	150 feet
Standard Cabinet	Black Injection Molded Plastic	Black Injection Molded Plastic	Black painted Aluminum
Optional Cabinet	Double sided	Putty or Off-White Injection Molded Plastic, Black Painted Aluminum, Brushed Stainless Steel	Brushed stainless steel
Accuracy	+/- 1 Second	+0/-200 milliseconds	+0/-200 milliseconds
Power Consumption	PoE, IEEE 802.3af compliant Single sided: 3W Double sided: 4W	PoE, IEEE 802.3af compliant 8W actual consumption	PoE, IEEE 802.3af compliant 9.5W actual consumption
Dimensions	Single sided: 13.4" diameter x 2"D (34.3 cm x 5.1 cm) Double sided: 13.5" diameter x 8.5"D (34.3 cm x 21.6 cm)	12"L x 6"H x 2.28"D (30.5 cm x 15.2 cm x 5.8 cm)	17.5"L x 6"H x 2.28"D (44.5 cm x 15.2 cm x 5.8 cm)
Weight	Single sided: 2 lbs (0.9 kg) Double sided: 7.9 lbs (3.6 kg)	Plastic Cabinet: 1.6 lbs (0.7 kg) Aluminum Cabinet: 2.2 lbs (1.0 kg) Stainless Steel Cabinet: 4.1 lbs (1.85 kg)	Aluminum Cabinet: 3.25 lbs (1.47 kg) Stainless Steel Cabinet: 5.6 lbs (2.5 kg)
Flush Mount Option	Not Available	Black or stainless steel	Black or stainless steel
Network Interface	10/100 BaseT		
Operating Temperature	32º to 104º F (0º to 40º C)		
Operating Humidity	95% maximum, non-condensing		
Certifications	UL/CSA 60950-1, ETL Listed, CE Marked, RoHS Compliant		
Warranty	Two (2) years, returned to factory. *Refer to Section 10 for warranty details.*		

Table 1: Technical Specifications

4. Installation

4.1. Pre-Installation

Before installing any display, you should:

- Obtain all necessary permissions from facilities managers or property owners.

- Develop a LAN diagram showing the desired location of each display unit.

- Plan the Power over Ethernet (PoE) power solution.

- Select a mounting method for the clock.

- Acquire tools and materials including assorted screwdrivers, power drill, and other materials necessary to ensure that mounting brackets are installed in compliance with building codes and restrictions.

4.2. Unpack the Clock

When the clock shipment arrives, inspect all packing boxes for damage. Unpack all clocks and inspect them so that you can report any damage to Novanex.

4.3. Power over Ethernet Cabling Plan

The OnTime Clocks require connection to PoE enabled network equipment that can source power in compliance with IEEE 802.3af. PoE power is commonly used to power devices such as wireless Access Points and IP telephones; it is usually injected into the LAN using either PoE enabled Ethernet switches or Mid Span power injectors. Consult with your IT Group to make sure that the required PoE equipment is in place.

4.3.1. Small Scale Installations

Single port PoE power injectors are the best means of powering PoE devices for a demonstration system or a small scale deployment. Novanex offers a single port PoE injector for sale to support these systems (see Figure 1). Refer to OnTime Store for more information on this part.

A power injector is typically installed in the communications room, and passes Ethernet communications through while also injecting power in accordance with the IEEE 802.3af standard. The 48 VDC power is only supplied to devices that request it through a handshake mechanism, so normal Ethernet devices are not damaged if connected to a standard PoE port. Note that a power injector requires a connection to AC power, and may be connected to a battery backed uninterruptable power supply (UPS).
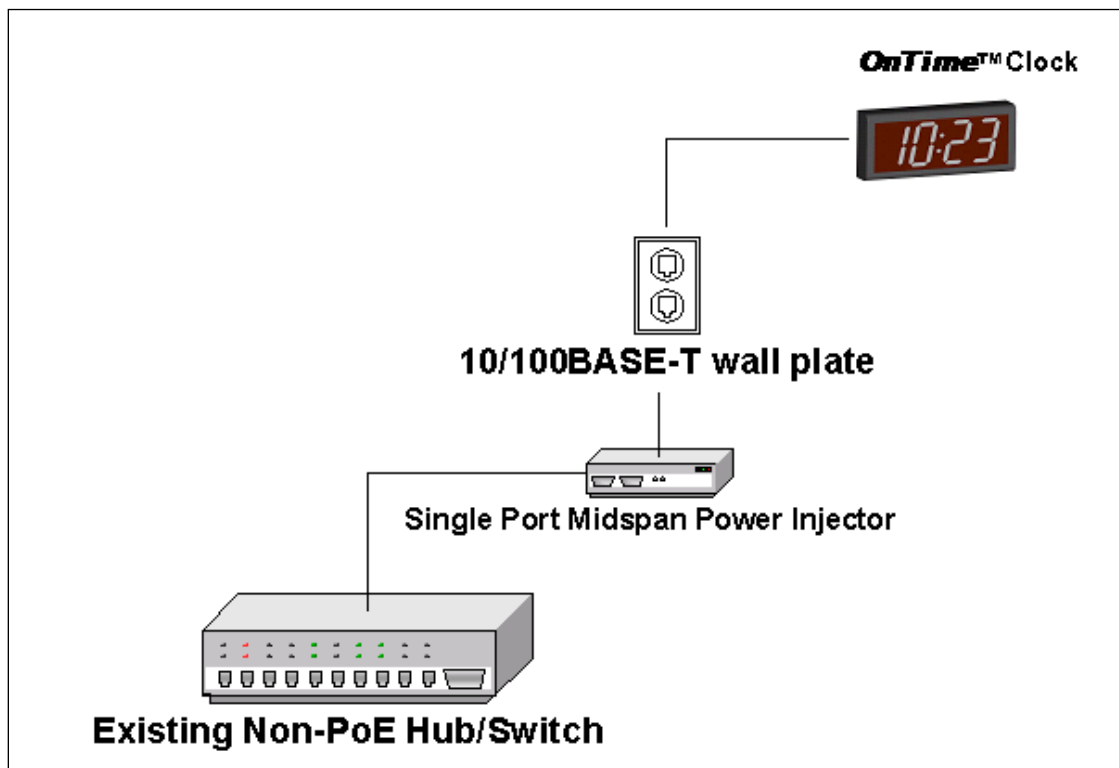
Figure 1: PoE Cabling Plan

4.3.2. Sites with PoE Enabled Network Equipment

Sites that are already equipped with PoE enabled network equipment are most likely already compatible with the OnTime Clock. The OnTime Clock will automatically request and receive power from a PoE enabled switch that conforms to the IEEE 802.3af standard.

If the site plan calls for a significant number of clocks to be powered from a single piece of network equipment, it may be useful to verify that that piece of equipment can deliver the necessary power. Some PoE enabled switches cannot deliver the full IEEE 802.3af power of 15.4 Watts per port or may require certain power options to do so. Refer to the specifications in Table 1 for the actual power consumption of all of the units and to the manual for your particular PoE enabled power sourcing equipment.

4.3.3. Sites with no Existing PoE Equipment

Sites that are not currently equipped with PoE enabled network equipment are typically best served by Midspan Power Injectors. The Midspan Power Injector is a multi-port rack mounted device that looks a lot like an Ethernet Switch. Typically it is installed in the rack near the existing Ethernet switch, and any ports that require PoE service are routed through the Midspan Power Injector.   These units are typically available in 6

port, 12 port, 24 port, or 48 port configurations. The OnTime Store offers a single port PoE injector for sale to support demonstration systems. *Note that Midspan Power Injectors can also be configured for battery backup.*

The OnTime Clocks require connection to a PoE enabled LAN. PoE power is usually injected into the LAN using either PoE enabled Ethernet switches or Mid Span power injectors. Consult with your IT Group to make sure that the required PoE equipment is in place.

4.4. Surface Mounting the Analog Clock

The following is a recommended procedure for surface mounting the analog clock:

1. Determine the clock mounting location.

2. Mark the Mounting Point location.

   Note that the Mounting Point is located 2½″ (6.35 cm) below the top of the clock rim.

3. Refer to Figure 2 to install the junction box for the data cable (if required) centered 2 ½″ (5 cm) to the right of the Mounting Point.
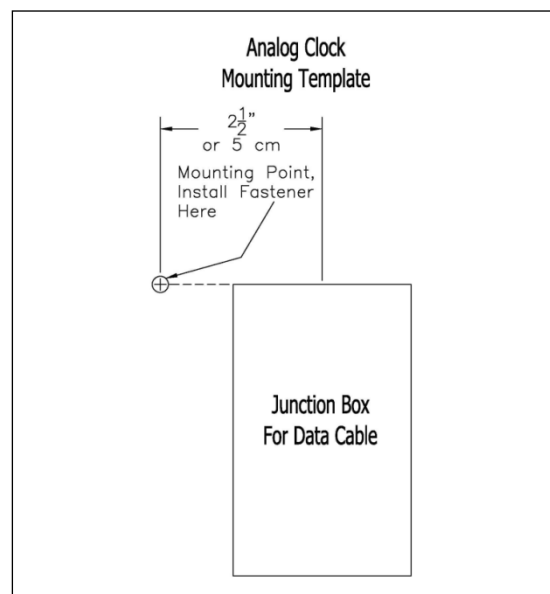
Figure 2: Analog Clock Mounting Template

4. Insert a flat-head fastener suitable for the wall surface at the marked point and tighten.

5. Withdraw the fastener until there is a ¼″ (or a little more than ½ cm) gap between the mounting surface and the back of the fastener head.

6. Insert the data cable into the jack located at the back of the OnTime Clock.

7. Position the keyhole slot located on the rear of the clock over the fastener head.

8. Pull the clock slightly downward until the unit is seated securely.

4.5. Mounting the Double Sided Analog Clock

1. Determine mounting location. There should be a solid stud or post for mounting the junction box and to hold the weight of the double sided clock.

2. Cut a 4 $^1/_8$″x 4″ (104.7mm x 101.6mm) hole in the drywall. (See Figure 3.)
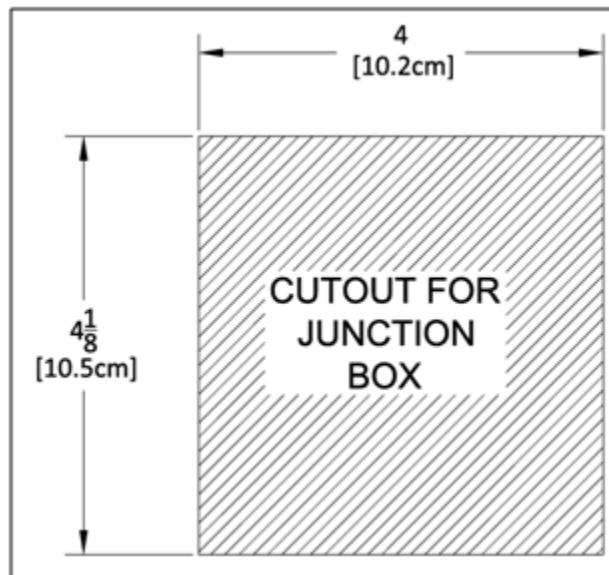
Figure 3: Analog Clock Cutout Template

3. Mount the junction box (item 1 in Figure 4) to the stud or post in accordance with local regulations.
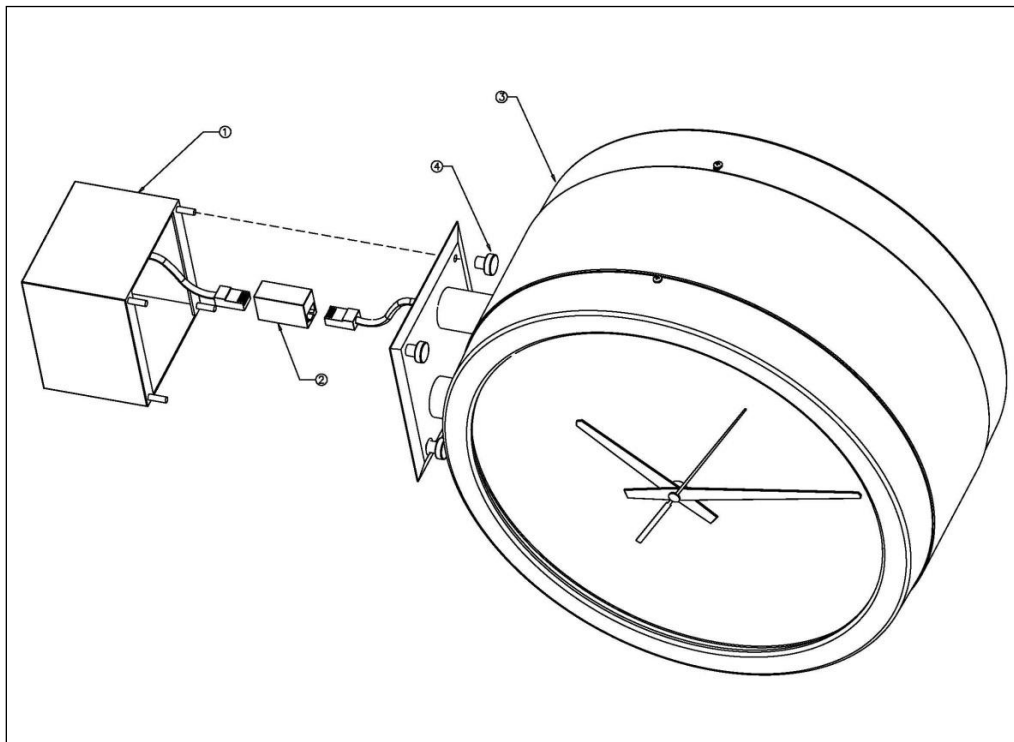
Figure 4: Analog Clock Double Mount Assembly

4. Route the data cable to the junction box in accordance with local regulations.

5. Plug the data cable into the connector (item 2 in Figure 4).

6. Mount the clock assembly (item 3 in Figure 4) to the studs on the junction box and secure the unit with the nuts provided (item 4 in Figure 4).

7. For ceiling mount applications, the orientation of the clocks can be corrected by removing the screws that secure the clocks to the housing and rotating the clock 90 degrees to the desired position.

4.6. Surface Mounting the Digital Clock

The following is a recommended procedure for surface mounting the digital clock. No mounting kit is required.

1. Determine the clock mounting location.

2. Mark two points 10" (25.4 cm) apart which are level and centered on the data cable outlet.

   Note that both models are mounted with a ten inch distance between screw hole centers; however, the best location for the wall jack varies. Refer to the templates in Figure 5 and Figure 6 to ensure that you line the wall jack up with the recess in the back of the unit.
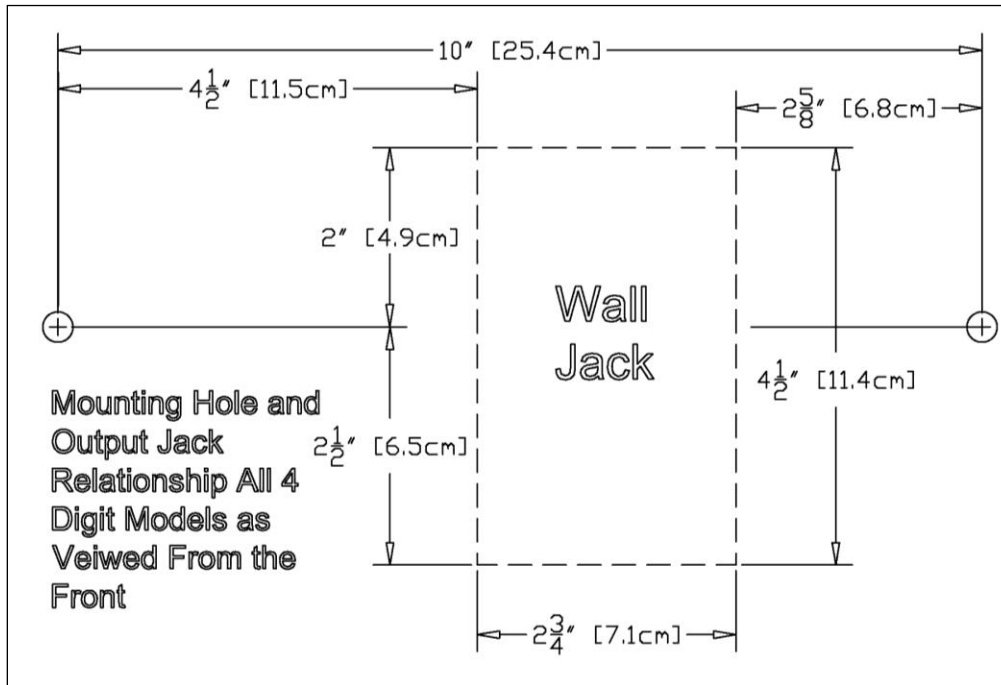
Figure 5: Mounting Template for 4-Digit Clocks
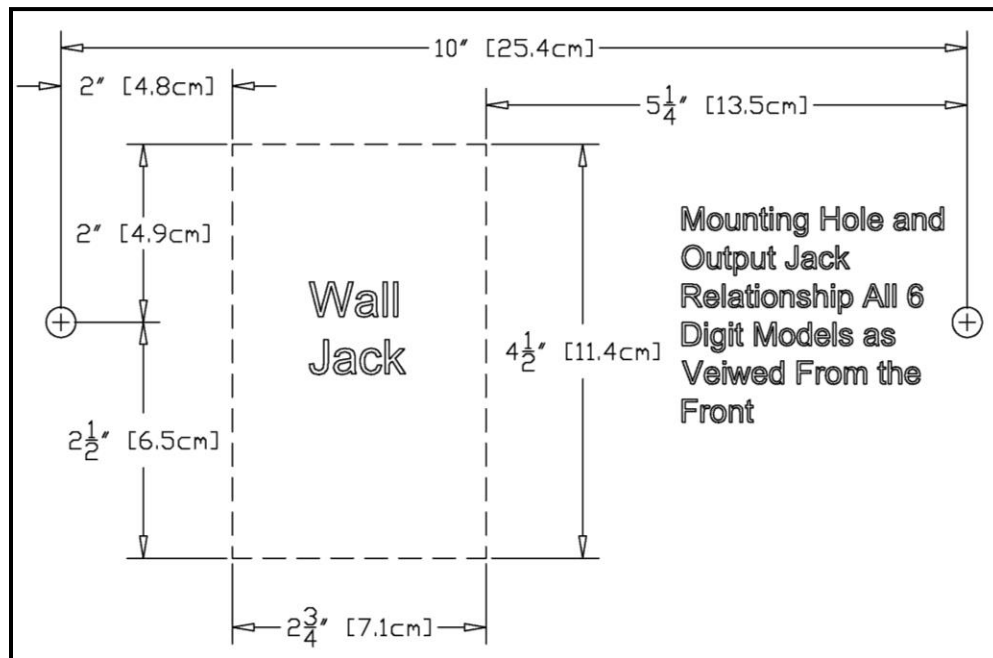
Figure 6: Mounting Template for 6-Digit Clocks

3. Insert two flat-head fasteners suitable for the wall surface at the marked points and tighten.

4. Withdraw the fasteners until there is a $^1/_{16}''$ (.16cm) gap between the mounting surface and the back of the fastener head.

5. Insert the data cable into the jack located at the back of the OnTime Clock.

6. Position the keyhole slots located on the rear of the clock over the fastener heads.

7. Pull the clock slightly downward until the unit is seated securely.

4.7. Pendant Mounting the Digital Clock – Single or Double

The following is a recommended procedure for pendant mounting. This procedure requires a mounting kit (either ONT4KIT or ONT6KIT) and some additional hardware.
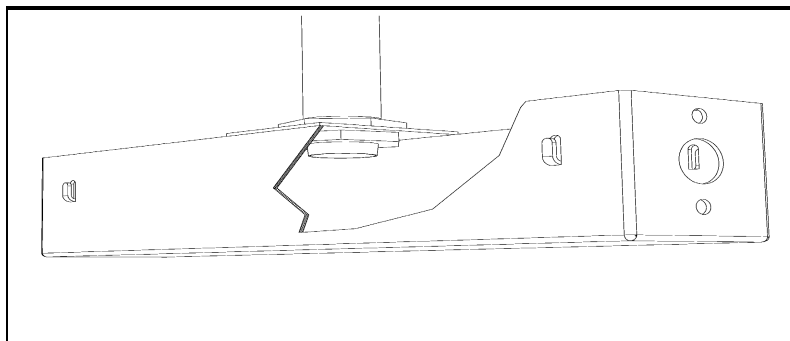
Figure 7: Digital Clock Pendant Mounting

1. Determine the clock mounting location.

   Note: The illustration above suggests a recommended mounting means for a pendant mount of one or more OnTime Clocks. Supplement the mounting kit with two suitable locknuts and a length of ¾″ (1.9 cm) pipe or conduit.

2. Mark the location where the clock assembly is to be mounted, making sure that the mounting means is located beneath the data cable outlet.

3. Assemble and tighten the locknuts and pipe length as shown above.

4. Insert about 10 to 12 inches (30 cm) of data cable through the center hole of the mounting kit. Securely attach the mounting means, using fasteners suitable for the surface.

5. Lift an OnTime Clock into position and insert the data cable into the jack located on the back of the clock.

6. Position the keyhole slots located on the rear of the clock over the mounting tabs.

7. Pull the clock slightly downwards until the unit is seated.

8. Repeat for the second clock if two clocks are being installed back-to-back.

4.8. Cantilever Mounting the Digital Clock – Single or Double

The following is a recommended procedure for cantilever mounting. This procedure requires a mounting kit (either ONT4KIT or ONT6KIT).
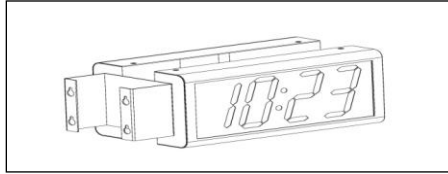
Figure 8: Digital Clock Cantilever Mounting

1. Determine the clock mounting location.

2. Using the template provided, mark the location where the clock is to be mounted, making sure the center is located over the data cable outlet.

3. Join the Ethernet Clock Mount and the Ethernet Clock Cantilever Wall Mount using a #2 Phillips screwdriver and a $^3/_8''$ wrench. Make sure that the two washers are fitted between the Clock Mount and the Cantilever Wall Mount. Refer to Figure 9.
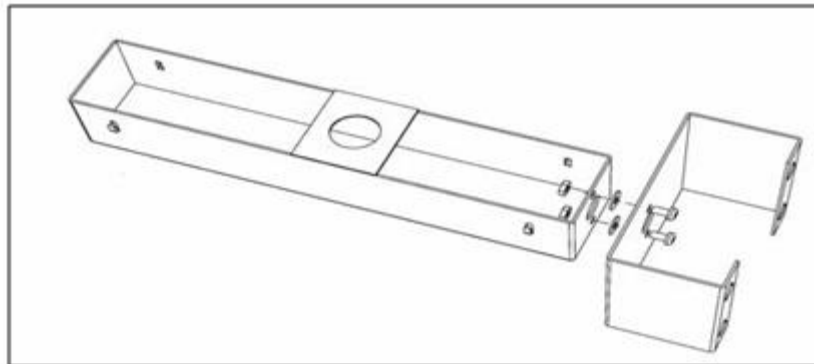
Figure 9: Digital Clock Mounting Kits

4. Insert 10 to 12 inches (30 cm) of data cable through the center hole of the mounting unit.

5. Attach the unit to the wall with fasteners suitable for the surface.

6. Lift the clock into place and insert the data cable into the jack located on the back of the clock.

7. Position the keyhole slots located on the rear of the clock over the mounting tabs on the clock mount.

8. Pull the clock slightly downwards until the unit is seated securely.

9. Repeat for the second clock if clocks are being installed back-to-back.

4.9. Flush Mounting the Digital Clock

The flush mounting feature of the OnTime Clock provides an attractive, streamlined mounting that blends with all room decors. This simple system hides the clock body, while still giving full viewing access to the time face with no visible wiring.

The following is the recommended procedure for flush mounting.

1. Ensure that the location that is chosen for mounting is pre-wired with a data network feed.

2. Cut an appropriately-sized opening into the wall. Refer to Table 2 for appropriate dimensions for the opening.

Model	Vertical Dimension	Horizontal Dimension
4-Digit	12 $^3/_8$″ or 31.4 cm	6 ½″ or 16.5 cm
6-Digit	17 $^7/_8$″ or 45.4 cm	

Table 2: Dimensions for Mounting Digital Clock

Clearance within the wall should be at least 2 ½″ (6.4 cm) deep to allow for the clock body.

When cutting the opening please use the template provided. This will help ensure that the opening is square as well as the proper size and in the correct location. For the template, refer to Figure 10 and Figure 11.
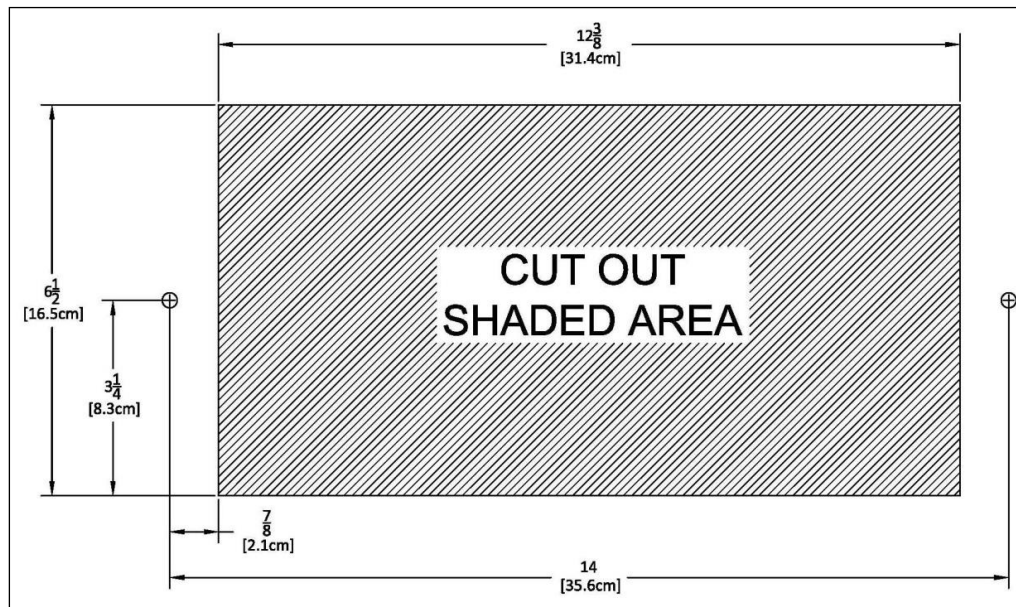
Figure 10: Cut-out Template for 4-Digit Clocks
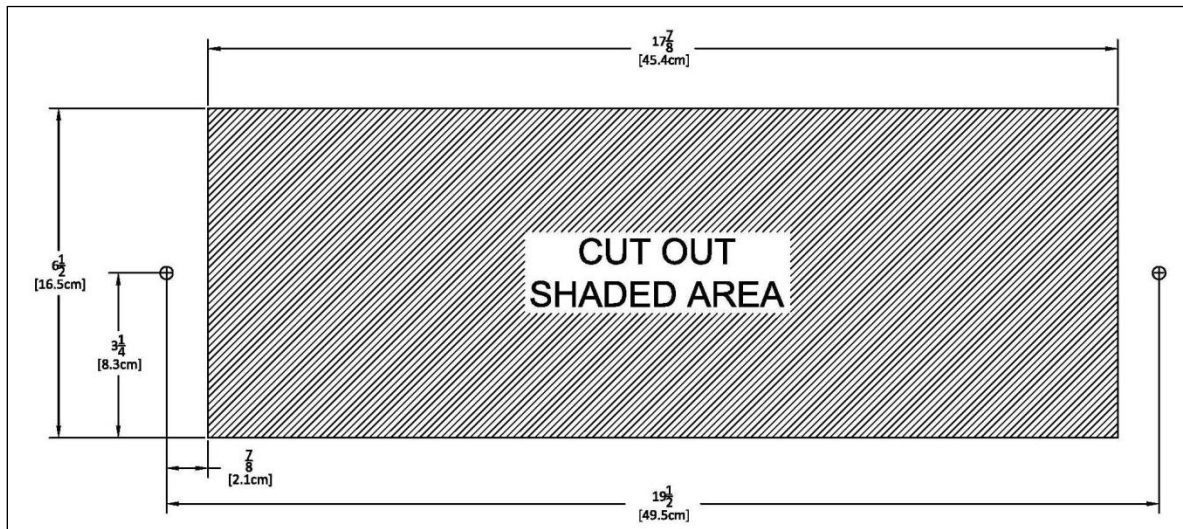
Figure 11: Template for 6-Digit Clocks

3. Using the template provided, locate the holes for the customer supplied hardware.

4. Drill two 5/16" holes.

5. Once holes for the bolts have been made, install #6 molly anchors in the holes, tighten until they expand, and then withdraw the screws.

6. Cut out the shaded area indicated on the template.

7. Install the data cable in the rear of the clock as shown in Figure 12. The clock is now ready for installation.
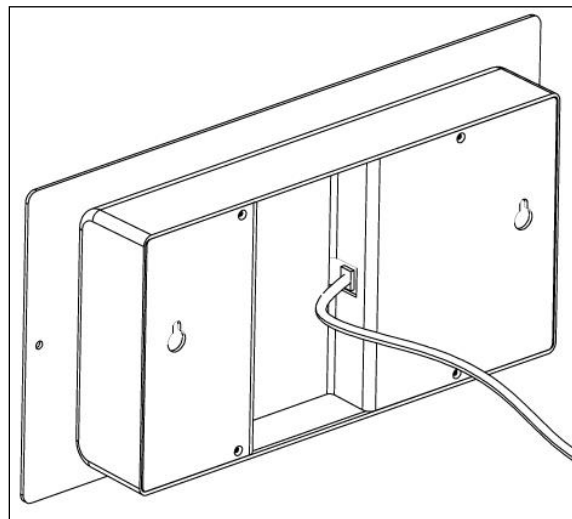
Figure 12: Data Cable Installation

8. Place the clock/flush mount assembly in the hole and re-install the screws, as seen in Figure 13.
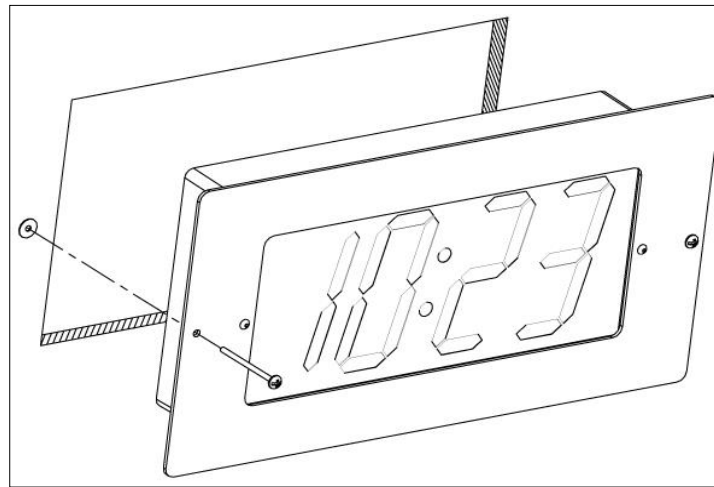
Figure 13: Clock/Flush Mount Assembly

4.10. Power Up and Verification

Once the installation is complete, power up the units by connecting them to a PoE enabled Ethernet LAN. Both the analog and digital clocks will follow the power up sequence described below. *Note that the process shown assumes the factory default of DHCP addressing is in place.*

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The digital clock face and the small display on the rear of the analog clock show the following:
- All LED segments illuminate for about 3 seconds.
- The firmware version is shown for about 3 seconds.

If the display remains dark, check the wiring and verify that this network port is set up to provide IEEE 802.3af PoE.

The digital clock face and the small display on the rear of the analog clock show the following:
- **'dhcp'** is shown while waiting for an IP Address.
- The IP Address received is displayed in four segments.

If the clock continues to display **'dhcp'**, check with your IT Group to verify that the clock is installed in a location with DHCP service.

The digital clock face and the small display on the rear of the analog clock show the following:
- **'----'** is shown while the clock is waiting for a time update from the specified NTP server.
- The current time is displayed once it is received.

If the clock continues to display **'----'**, check with your IT Group to verify that the time server is properly specified.

Figure 14: Power Up Sequence

5. Configuration

5.1. Introduction to SNTP

Simple Network Time Protocol (SNTP) is widely used to synchronize time on computers. The IT Group within an enterprise usually designates a local server or set of servers responsible for maintaining accurate time as a time standard for the network. These servers typically synchronize to a reliable external Internet time source.

The OnTime Clock must be configured with the network location of at least one time server; the OnTime Clock supports setting an optional secondary time server to be used in the case that the primary time server is unavailable. The default setting for the primary time server is an Internet time server operated by Novanex, but this is intended for temporary use only because IT Groups prefer not to have individual clocks connecting to the Internet. Your IT Group should specify one or two local SNTP or NTP time servers or routers to be the primary and optional secondary time servers with which to synchronize the clock.

5.2. Introduction to the OnTime Management System

Novanex offers a service through its support site to assist in management of your clock system. This service is available to registered customers at ontime.inovasolutions.com, and is described on the website.

5.3. Clock Configuration

Once a clock is installed, the next step is to confirm or set the configuration.   Though there are a number of settings you can confirm or change on a clock, you should concentrate on four configuration items initially. These include:

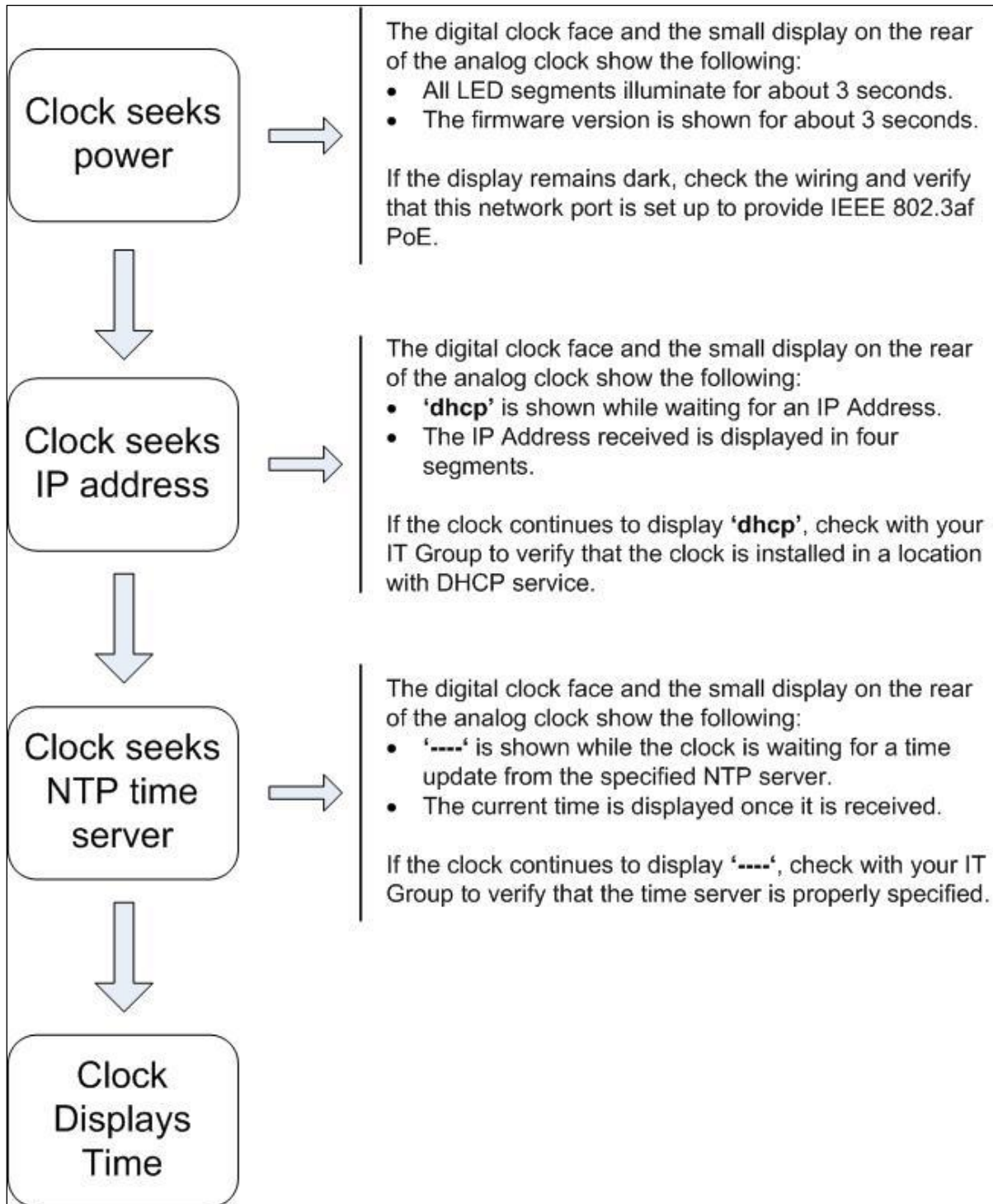- An **IP address** so that the clock can communicate on the network; the clock supports working with either IPv4 or IPv6. In IPv6 mode, IP addressing must be statically assigned and DHCP is not available.

- A **network time server** so that the clock knows with which computer it should be synchronized.

- The **local time zone** so that the clock can display the correct local time.

- The **Daylight Saving Time (DST)** rule so that the clock can automatically adapt to local DST.

Before working with these settings, however, you have to consider which configuration method to use. In IPv6 mode, only the third option below is available. In IPv4 mode, you have three options:

Configuration Method	Description	Reference
The **recommended** method in IPv4 mode is to assign both the IP address and all options via a DHCP configuration string.	This method is the only way to address and configure a group of clocks without requiring a telnet session into each clock. Clocks are factory set with DHCP enabled. Using this method, the DHCP Server is set up with a clock configuration string. Clocks will automatically request the configuration string when they request an IP address.	Section 6
The second method is to assign an IP address via DHCP and set individual configuration options via a telnet session.	Clocks are factory set with DHCP enabled. The options may be set using telnet commands.	Section 7
The third method is to assign an IP address and individual configuration options via a telnet session.	Use telnet commands to assign both a static IP address and the appropriate configuration options. Note: that if you have more than one OnTime Clock, you will need to configure each one individually with this option.	Section 7

Table 3: Clock Configuration Methods

6. Using DHCP for Addressing and Configuration

6.1. DHCP Configuration

IT Groups that use DHCP to assign IP Addresses often use DHCP options to configure PCs and other devices on the network. Typical examples of these options are:

- DHCP Option 1 to specify the subnet mask.

- DHCP Option 3 to specify the router that is the default gateway.

- DHCP Option 6 to specify the DNS Server.

When PCs and other devices come up on the network, all of these parameters are set automatically if they are configured at the DHCP Server. In addition, any institutional changes will automatically convey to the devices when they restart.

DCHP options in the range of 128 to 254 are available for use for site-specific purposes. The OnTime Clock takes advantage of the DHCP option slots to enable plug and play installation of clocks. The OnTime Clock is preset to request its local configuration from the DHCP server using DHCP option 230. If option 230 is set up on the DHCP Server with a valid configuration string, then the clock can configure itself automatically.

This option reduces the work required to configure multiple clocks, because rather than configuring each individual clock though a telnet session, the configuration is done one time at the DHCP server.

The optional OnTime Management settings can be specified via DHCP Option 231. When so configured, the clock will send status updates to the OnTime Management server specified in DHCP option 231.

DHCP Server changes are typically made by the IT Group.

DHCP is not available in IPv6 mode.

6.2. DHCP Configuration Settings

The OnTime Clock requires these settings to properly display local time:

Setting	Description	Applies to...	
		Digital	Analog
Time Server	Sets the primary network time server so that the clock knows with which computer to synchronize its time.	✓	✓
Time Zone	Sets the local time zone so that the clock can display the correct local	✓	✓

Setting	Description	Applies to...	
		Digital	Analog
	time.		
Daylight Savings Time (DST)	Sets the DST rule so that the clock can automatically adapt to local DST.	✔	✔
24-hour	Sets a 12- or 24-hour time display. The factory default is 12 hour time.	✔	*No effect*
Show/hide colon	Determines whether the colon is shown on the display. The factory default is to show a colon as a separator between hours and minutes.	✔	*No effect*

Table 4: DHCP Configuration Options

6.3. DHCP Configuration Test and Rollout

The recommended practice is to load the configuration string into the DHCP Server and then try it with one clock by re-booting the clock. Once you are confident that the one clock is properly configured using these settings, you can then plug in additional clocks to add them to the network, knowing that they will automatically receive the proper configuration settings as well.

Note: A clock must be re-booted to request a new configuration string from the DHCP Server. The clock *does not* automatically request a new configuration string at the expiration of the DHCP lease interval.

6.4. Creating a DHCP Configuration String

Table 5 describes the six options that can be used in a configuration string when establishing a DHCP Server option for automatically configuring the clock. The format used is **option name=option value**, with the options separated by semicolons in the configuration string. This string is added to the DHCP Server, as described in the next section. (See Table 4 for example configuration strings).

Option Name	Option Value	Configuration Setting	Description
timeserver	SNTP Time Server name or IP address	SNTP Primary Time Server (sntp –h command)	Sets the Primary SNTP Time server Host Name or IP address to use for time synchronization. If a Host Name is used, then the DHCP Server must also provide a DNS server to use to resolve the Host Name.
timezone	hh:mm time offset	Timezone offset (timezone command)	Sets the number of hours and minutes to offset from UTC time when displaying time. This can be negative. The minutes (:mm) are optional.
dst	none, [rule specification]	Daylight Saving Time (dst command)	Establishes the Daylight Saving Time rule. none - Disable the Daylight Saving Time adjustment. Other values are parsed based on the DST rule format. The format is 8 numbers in the order: startDOW startDay startMonth startTime endDOW endDay endMonth endTime
24hour	true, false, t, f	Clock hours display mode (display -t command)	Sets the time format for the digital clock (ignored by the analog clock). If *true* the clock uses 24hour (military) time format and disables the AM/PM light; otherwise it uses 12hour time format and enables the AM/PM light.
showcolon	true, false, t, f	Clock colon display mode (display -c command)	Sets the use of the colon on the digital clock (ignored by the analog clock). If *true* the colon separator between the hours and minutes is lit.
mgmt_server	Server name or IP address	Management Server (mgmt –a command)	Sets the management server address to which the clock will send web status registration

Table 5: DHCP Option 230 String Parameters

Note that while the primary time server can be set by DHCP configuration, the secondary time server can only be specified by logging on to the OnTime Clock via telnet and issuing the **sntp –e** *command (see Section 8).*

Table 6 contains examples of the configuration strings.

Command	Description
timeserver=ntp.inovasolutions.com; timezone=-5;dst=-1 8 2 2 1 1 10 2	• Sets the primary time server to ntp.inovasolutions.com • Sets the time zone to Eastern Standard Time (-5 hours from UTC) • Enables DST for US 2007 rules
timeserver=10.1.128.1; timezone=0; dst= 1 -1 2 1 1 -1 9 1	• Sets the primary time server to IP Address 10.1.128.1 • Sets the time zone for Western European Time • Enables DST for EU 2007 rules
timeserver=10.1.128.1; showcolon=true ; 24hour = true ; timezone=-5;dst=-1 8 2 2 1 1 10 2	• Sets the primary time server to IP Address 10.1.128.1 • Enables the colon display and sets the clock to 24 hour mode • Sets the time zone to Eastern Standard Time (-5) • Enables DST for US 2007 rules

Table 6: Examples of Common DHCP Configuration Strings

6.5. OnTime Management Settings

The OnTime Management settings shown in Table 7 can be provided via DHCP Option 231 (or an alternate option number specified on the clock).

Option Name	Option Value	Configuration Setting	Description
cloudserver	ontimelistener.inovasolutions.com	ontimelistener.inovasolutions.com (mgmt –c command)	Sets the OnTime Management server Host Name to *ontimelistener.inovasolutions.com*. The clock configuration must include a DNS server to use to resolve this Host Name (ipconfig –p command or DHCP option 230).
sitetoken	Your OnTime Clock Token	Your OnTime Clock Token (mgmt –t command)	Sets the token representing the site to which the clock belongs; for use by the OnTime Management system.

Table 7: OnTime Management Properties

6.6. Setting Different DHCP Option Numbers for a Clock

You do not have to use DHCP configuration options 230 and 231 for the clocks. You can also create custom options using different option numbers. If DHCP option 230 is already in use on your DHCP Server, you can configure your clock to use another DHCP option instead, in the range 128-254 (e.g., option 245). The **ipconfig -o** command can be used to

set a different DHCP option number on the clock or to disable this feature altogether. The ipconfig command is defined in Appendix A.

The OnTime Management settings can be configured via any DHCP option number in the range 128-254, by using the mgmt –o command on the clock. Configuring the OnTime Management settings via DHCP can disabled by setting the mgmt –o command on the clock to 0 (zero). The mgmt command is defined in Appendix A: Clock Configuration.

6.7. Verifying the DHCP Configuration Settings on a Clock

The **dhcpconfig** telnet command lists all the configuration settings that were retrieved by the clock from the DHCP Server and that are currently in effect. If an error arises while parsing the DHCP options received from the server, the error will be shown in the command output.

The dhcpconfig command output below shows the settings that were received from the DHCP Server using the configuration string in the first row of Table 6.

```
dhcpconfig

Using Option Code 230 for DHCP based Clock Configuration.

The following DHCP based configuration settings are in use:

Time Server  : ntp.inovasolutions.com

Time Zone    : -5

DST Rule     : -1 8 2 2 1 1 10 2
```

Notes:

- A clock must be re-booted to request a new configuration string from the DHCP Server. The clock does not automatically request a new configuration string at the expiration of the DHCP lease interval.

- If option 230 (or the alternate specified on the clock) is not configured on the DHCP Server, the clock will receive an IP address in the usual fashion but the clock's settings for Time Server, Time Zone, DST, etc. will come from the default internal configuration.

6.8. DHCP Configuration Example for Microsoft Server

Appendix B: Configuring DHCP Options for Microsoft Servers, contains an example of how to configure options on a Microsoft DHCP Server, such as the one that is bundled with Windows 2003 Server. It is for reference only. It is assumed that skilled IT personnel are the only people authorized to edit DHCP Server settings.

7. Telnet Configuration

Clocks can also be individually configured using a telnet session. Each clock needs to be set up with the following minimum configuration.

- An **IP address** so that the clock can communicate on the network. This can be either static or DHCP served.
- A **network time server** so that the clock knows with which computer it should be synchronized.
- The **local time zone** so that the clock can display the correct local time.
- The **Daylight Saving Time (DST)** rule so that the clock can automatically adapt to local DST.

Appendix A: Clock Configuration, contains a complete list of telnet commands for reference. You can also refer to the OnTime FAQ on the support site for more configuration assistance.

7.1. Establishing a Telnet Connection to the Clock

Connect the clock to a PoE enabled network and watch the digital display face or the rear digital display on the analog clock for the DHCP served IP Address. If an IP Address appears, use this address in the steps below. If the letters 'dhcp' remain on the display, then either temporarily move the clock to a network segment with DHCP service, or set up a 'bench' network composed of just the clock and a PC using a crossover cable. You may need to consult your IT department and use the default link-local IP Address to make a connection.

Once you have the clock's IP Address, you can then establish the telnet connection:

1. Choose Run from the Windows Start Menu.
2. When the Run window appears, type **cmd** and press Enter.
3. When the command line window appears, type the telnet command **telnet** xxx.xxx.xxx.xxx, where *xxx.xxx.xxx.xxx* is the known IP address of the clock.

    Note: Windows Vista users may need to change the default windows configuration in order to use telnet. Contact your IT Group for assistance.

4. The clock's service light begins to blink and the clock login prompt appears:

    ```
    Inova Solutions OnTime Clock Version xxx
    iclock login:
    ```

5. Enter the user name: **iclock**.
6. When the clock's password prompt appears (`iclock password: `), enter the clock's password (the default is **timely**).

7. The clock's telnet prompt appears: `iclock-### />` *(This is actually the clock's hostname, which by default is 'iclock-###' where '###' are the last three characters of the clock's MAC address.)*

8. You are now ready to set configuration using the telnet commands.

For help with a specific telnet command, at the prompt, type **help** followed by the desired command. For example, to see help for the display option, type **help display.**

7.2. Configuring an IP Address

There are three options for configuring an IP Address to each OnTime Clock:

- DHCP [Factory Default]

- Assigned Static IPv4 Address

- Auto-Configured IPv6 Address

7.2.1. DHCP

The factory default is DHCP. Refer to Section 6 for more information on DHCP. Refer to Appendix A for help changing from a Static IP Address to DHCP.

7.2.2. Assigned Static IPv4 Address

Note: Your IT staff must authorize and provide a static IPv4 address to prevent operational problems which might occur if that address is applied to another device on the network.

To enter a fixed IPv4 address into your clock's firmware, start a telnet session with the clock and the use the following command option:

```
ipconfig -a xxx.xxx.xxx.xxx -m yyy.yyy.yyy.yyy -g
zzz.zzz.zzz.zzz
```

where:

- `xxx.xxx.xxx.xxx` is the IPv4 address

- `yyy.yyy.yyy.yyy` is the subnet mask

- `zzz.zzz.zzz.zzz` is the gateway address.

All fields must be provided.

7.2.3. Auto-Configured IPv6 Address

The OnTime Clock supports IPv6 Networking with the following command:

```
ipconfig -v v6
```

When placed into IPv6 mode, the clock will use SLAAC (Stateless Address Auto-Configuration) to create an IPv6 address based off of its MAC address and router advertisements, as defined by RFC 4862. While in IPv6 mode, the clock will only support IPv6 communication, and must be specifically configured. Refer to Appendix A for information on the IP configuration commands.

- DNS Servers must be specified as literal IPv6 addresses for the OnTime Clock to perform name resolution.

- Time Servers must be specified as either literal IPv6 addresses or hostnames with a registered AAAA record.

- Telnet connections can only be made via the OnTime Clock's IPv6 address or when connected directly to the PC via the link-local 169.254.0.100 IPv4 address.

- When using a literal IPv6 address in the update command, the port number MUST be specified. Netboot will function correctly with no additional configuration.

Note that while in IPv6 mode, the clock will not register with a DNS or DHCP server. It is strongly recommended that you record your clock's MAC address when placing it into IPv6 mode.

In order to make the management of your system as easy as possible, Novanex recommends that you record the IP Address for each clock in a table similar to the one below, particularly if you have elected to set a static IP Address.

Clock Name or Location	IP Address

Table 8: IP Address Reference Table

8. Specifying a Time Server

Specify by IP Address or Host Name the primary and secondary network time servers on the LAN, WAN, or Internet with which the OnTime Clock will synchronize its time.

Note that while the primary time server can be set by DHCP configuration (Section 6), the secondary time server can only be specified by logging on to the clock itself.

- Specifying by IP Address is typically only safe if the address of the server is under your IT group's control. When specifying time servers on the Internet, use the Host Name.

- Specifying by Host Name requires that a DNS server is accessible to the clock:

  - If the clock's IP addressing is static, the DNS servers must be identified and configured as well.

  - If the clock's IP addressing is via DHCP, the DNS servers are typically already automatically configured (do not over configure!)

The process for specifying a time server on the clock is the same for both Host Name and IP Address.

1. Log into the OnTime Clock.

2. At the prompt, type **sntp –h** to specify the primary time server or type **sntp –e** to specify the secondary time server.

3. Press the spacebar.

4. Enter the Host Name or IP Address of the time server.

5. Press the Enter key.

It is always a good idea to test the synchronization between the clock and the time server(s). To do that, perform these steps:

1. At the prompt, type: **sntp -s** (Be sure there is a space between sntp and -s)

2. Press the Enter key.

The clock displays SNTP settings and immediately attempts synchronization with the primary time server (if the primary is unavailable and the secondary is defined, it will try the secondary after about 90 seconds).

By default the primary time server is set to **ntp.inovasolutions.com** and the secondary is not set. In general, the primary server setting should be changed to an internal time server under IT control. There is more information on NTP, SNTP, and time server selection online at the support site.

8.1. Setting the Time Zone

Coordinated Universal Time (UTC) is a time standard based on the time at zero degrees longitude (also known as Greenwich Mean Time or GMT). Time zones around the world are expressed as positive or negative offsets from UTC. The default time zone setting for the clock is UTC -5 (aka GMT -5), which is the time zone for Eastern Time (US & Canada). You can change this setting with the following command:

```
timezone -N [or] timezone N
```

where **N** is the time zone offset from UTC, -11 to 12.

Note: If you're not sure what time zone offset to use, check the time zone value used on a Windows PC on your network; double-click the time in the Windows service tray (in the lower-right corner of your screen) and choose the Time Zone tab.

8.2. Configuring Daylight Saving Time

The following table identifies the process for setting daylight saving time.

DST Setting	Command
No Daylight Saving Time	Type the command to disable DST: **dst -none** Press the Enter key.
In the U.S. and Canada	Type: **dst -rule -1 8 2 2 1 1 10 2** Press the Enter key.
For European Daylight Saving Time	Type: **dst -rule 1 -1 2 1 1 -1 9 1** Press the Enter key.
Other locations	The support site contains a DST calculator which can compute the correct DST configurations string for you location. Obtain the correct string and enter it with the *dst -rule* command.

Table 9: Configuration for Daylight Saving Time

Three additional time related configuration items should also be set initially. The commands for setting 12/24, AM/PM, and Colons On/Off are identified in Appendix A.

9. Troubleshooting

The following table contains several trouble conditions you may encounter with the OnTime Clock and the recommended actions to take to correct the problem. The up-to-date troubleshooting help is available in the FAQ on the support site.

Condition	Solution
The Digital Clock face or Analog Clock rear display is dark.	Verify that the network port is capable of supplying PoE power. Reboot the clock by disconnecting the data cable, counting to five, and reconnecting the cable. It takes as long as 20 seconds for the display to go active.
Analog Clock hands are not moving.	If the hours and minutes hands are close to correct time, check the position of the second hand and refer to the stopped second hand item below. Remove the clock from the wall, check the digital display, and refer to the appropriate entry in the troubleshooting table. If the digital display is dark, verify that the network port has proper PoE power.
The clock shows incorrect time.	If the minutes past the hour are correct, verify the Time Zone and Daylight Saving Time settings. For Digital Clocks, check if the Service Light is illuminated (see below). For Analog Clocks, check the time on the small rear display.
The Analog Clock second hand has stopped moving.	The second hand on the analog clock will stop moving to indicate a failure of the time synch from the time server. It usually stops at 5 seconds past the top of the minute to indicate this problem. Cycle the power on the clock by disconnecting the network cable and reconnecting. Then watch the rear display to see if the proper time is received.
A 'dhcp' message shows on the Digital Clock face or Analog Clock rear display.	The clock has failed to receive an IP address from the DHCP Server. Contact your IT group responsible for DHCP service. **Note:** The clock is reachable through its fixed link-local address for diagnostic or re-configuration purposes while the bottom right service light is on. The link-local address is 169.254.0.100**.**
The service light is blinking.	The service light is located at the bottom right of the Digital Clock face. When the light is blinking, this means that there is an active telnet session in progress on the clock. **Note:** that this functionality may not be present on the Analog Clock.

Condition	Solution
The service light is on.	The service light is located at the bottom right of the Digital Clock face. When the light is on steady, it usually means that the time server can no longer be reached. **Note:** that this can also happen if the DHCP served IP Address cannot be renewed. Reboot the clock to verify that it properly receives a DHCP address. Verify that time appears on the display. If the 'dhcp' message is displayed, the service light signals that the clock can be reached by its fixed link-local address.
Determine the IP Address of a Clock	Lift up gently on the unit to free the keyholes at the rear of the clock from the mounting hardware. Disconnect the network cable and count to five. Replace the network cable and watch the Digital Clock face or the Analog Clock rear display for the IP Address. Record the IP Address and location.
Digital Clock Face or Analog Clock rear display showing '----'	The Time Server is either not properly specified or is unreachable.
The Clock displays 'IP 6' on startup and cannot be reached by hostname	The Clock has been placed into IPv6 mode. Record the IPv6 Address of the clock that is shown after 'IP 6' and use this address to reach the clock. If an IPv6 telnet client is not available, connect the clock directly to the PC with a crossover cable and use the link-local address to re-configure the clock into IPv4 mode.

Table 10: Troubleshooting the OnTime Clock

10. Warranty and Maintenance

10.1. Warranty

Novanex warrants the OnTime Clocks to be free from defects in material and workmanship during a two-year period[1]. The Warranty begins on the date the unit is shipped from Novanex. Extended warranties are available via an Novanex Service Agreement (ISA).

Novanex liability under this Warranty is limited to repairing or replacing, at Novanex option, the defective equipment and providing upgrade version changes for firmware. In case of repair, the product must be returned to an authorized Novanex Service Center.

This Warranty does not apply if repairs are required due to acts of nature beyond Novanex control such as, but not limited to, lightning strikes, power surges, misuse, damage, neglect, or if repairs/modifications have been made or attempted by anyone other than personnel authorized by Novanex. This Warranty does not apply if the clock is installed in an exterior location.

In no event will Novanex be liable for any indirect, special, incidental, or consequential damages from the sale or use of this product. This disclaimer applies both during and after the term of the warranty. Novanex disclaims liability for any implied warranties, including implied warranties of merchantability and fitness for a specific purpose.

10.2. Repair and Returns

To obtain service under this Warranty, contact Novanex at (434) 509-1108 during the Warranty period to receive a Return Material Authorization (RMA) number and shipping instructions. Then ship the product believed to be defective, transportation prepaid, for inspection.

Typical equipment repair or replacement time is seven (7) business days, plus shipping times. One-way shipping is the Customer's responsibility. Novanex will return ship the equipment by the same means it was received.

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[1]Clocks shipped prior to March 1, 2014 carry a one year warranty. The two year warranty only applies to clocks shipped on or after that date.

Novanex will not be responsible for dismounting and remounting of the OnTime Clock, for unauthorized returns or for returns that do not list the RMA number and quantity returned on a packing list attached in plain view on the outside of the shipping container.

11. Glossary of Terms

Terms	Definitions
Cantilever Mount	This is a wall mount to the left or right side of the OnTime Clock unit, illustrated in Section 4, requiring the Digital Clock Mounting Kit.
DHCP	Dynamic Host Configuration Protocol (DHCP) is a communications protocol that lets network administrators manage and automate the assignment of IP Addresses on an organization's network.
DNS	The Domain Name System (DNS) is the way that Internet domain names are located and translated into IP Addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address.
Flush Inset	This model may be backplate-mounted to a customer-supplied enclosure.
GMT	Greenwich Mean Time; since replaced with UTC, the world time standard.
Host Name	Unique identifier for a device on a TCP/IP network. For example: 3rdFlrConfRm
IP Address	Unique identifier for a device on a TCP/IP network. For example: 11.15.55.233
NTP	Network Time Protocol; most NTP servers will respond to an SNTP time request
Pendant Mount	This is a ceiling mount, illustrated in Section 4, requiring the Digital Clock Mounting Kit.
PoE	Power over Ethernet, IEEE 802.3af
SNTP	Simple Network Time Protocol
Surface Mount	This is a simple flat wall mount identified in Section 4. No mounting kit is required.
Telnet	A network protocol and a software program that allows you to remotely access the command console of a computer over a network.
UTC	Universal Coordinated Time, formerly Greenwich Mean Time, is the World Time Standard. UTC is, by definition, the same at every point on Earth. Local times are indicated by offsets from UTC.

Table 11: Glossary of Terms

Appendix A: Clock Configuration

This section summarizes the configuration options available with the clock. For help setting up a telnet session, refer to Section 7- Telnet Configuration. For additional information, refer to the support site.

Condition	Solution
Get help for clock commands	**help** To see a list of all the telnet command names and options for which help is available. To see help for a particular command, type the **help** command followed by the command name for which help is desired**.** For example, to see help for the **display** option, type **help display**
Display the configuration settings for clock	**config** To display all configuration parameters except those sent by the DHCP Server. Use the DHCP config (dhcpconfig) command to view these superseding options
Verify DHCP Configuration settings	**dhcpconfig –** To list the option settings received from a DHCP Server (for verification purposes only). Use the ipconfig –d command to enable retrieving option settings from a DHCP server.
Display all Address Resolution Protocol (ARP) cache entries	**arp** Display all Address Resolution Protocol (ARP) cache entries.
View current SNTP settings	**sntp** To view the current time server and other SNTP settings
Test the Time Server Synchronization	**sntp -s** Display the SNTP settings, then invoke a time server synchronization request and display the results.
Specify the primary Time Server	**sntp –h hostname**, where *hostname* is the hostname of the primary time server; or **sntp -h xxx.xxx.xxx.xxx**, where *xxx.xxx.xxx.xxx* is the IP address of the primary time server
Specify the secondary Time Server	**sntp –e hostname** where *hostname* is the hostname of the secondary time server; or **sntp -e xxx.xxx.xxx.xxx**, where *xxx.xxx.xxx.xxx* is the IP address of the secondary time server; to be used in the event that the primary time server is unavailable

Condition	Solution
View or change the Daylight Saving Time (DST) setting	**No Daylight Saving Time** - Type the command to disable DST: `dst –none,` then press the Enter key. **US and Canada** - Type: `dst -rule -1 8 2 2 1 1 10 2` Press the Enter key. **European** - Type: `dst -rule 1 -1 2 1 1 -1 9 1` Press the Enter key . **Other Locations** – The support site contains a DST calculator which can compute the correct DST configurations string for your location. Obtain the correct string and enter it with the *dst –rule* command.
View or change the Time Zone	**timezone** - To view the clock's current time zone setting. **timezone –N or timezone N** - To change the clock's time zone setting, (don't use a + sign for positive values) where N = the desired time zone offset in the range -11 to 12. For example, to set the time zone for (UTC -5) Eastern Time (US & Canada), you would use: **timezone -5** **Note:** If you're not sure what time zone offset to use, check the time zone value used on a Windows PC on your network; double-click on the time in the Windows service tray (in the lower-right corner of your screen) and choose the Time Zone tab.
Configure the 12/24 Time Format **Note:** These commands are ignored by the analog clock.	**display –t 24** - Sets 24 hour display. **Note:** the space before and after the –t **display –t 12** - Sets 12 hour display. **Note:** the space before and after the –t
Configure the AM/PM Indicator **Note:** These commands are ignored by the analog clock.	**display –p off** Turns off pm indicator. **Note**: the space before and after the –p **display –p on** Turns on pm indicator. **Note**: the space before and after the –p
Configure Colons On/Off **Note:** These commands are ignored by the analog clock.	**display –c off** Turns off colons. **Note**: the space before and after the –c **display –c on** Turns on colons. **Note**: the space before and after the –c

Condition	Solution
View or Configure Clock's IP settings	**ipconfig** - To view clock's current IP settings.
	ipconfig -d - Use DCHP to lease an IP address and retrieve network settings. (Disables static IP addressing)
	ipconfig -o xxx - Use DHCP to lease an IP address and request a configuration string where *xxx* is the DHCP option number. The factory default is 230.
	ipconfig -o - Disable the configuration portion of the DHCP process.
	ipconfig -h hostname - To change the hostname of the clock, where *hostname* is the new hostname.
	ipconfig -b [on | off] - Set whether to show IP information at clock bootup.
	ipconfig -x - Show all Interface data.
	ipconfig –v [v4 | v6] - Set the IP version for the clock to use. Specify either "v4" or "v6"; the default is v4.
	v4 - IPv6 disabled, only use IPv4 addresses. v6 - IPv6 enabled, only use static IPv6 addressing. (Disables IPv4)
	The following options are ignored if DHCP is enabled:
	ipconfig -a IP - Use the specified fixed IP address. (Disables DHCP)
	ipconfig -m mask - Set the subnet mask.
	ipconfig -g gateway - Set the gateway address.
	ipconfig -a xxx.xxx.xxx.xxx -m yyy.yyy.yyy.yyy -g zzz.zzz.zzz.zzz - To configure a static IP address, where *xxx.xxx.xxx.xxx* is the IP address, *yyy.yyy.yyy.yyy* is the subnet mask, and *zzz.zzz.zzz.zzz* is the gateway address. (All the information is ignored if DHCP is later enabled.)
	ipconfig -n domainname - Set domain name.
	ipconfig -p IP - Set primary DNS address.
	ipconfig -s IP - Set secondary DNS address.
	ipconfig -t dnstimeout - Set DNS timeout (0 is valid).

| Condition	Solution
View log on session screen or enable/disable logging	**log** - To view the log on the session screen. **log on | off** - To enable/disable logging. When logging is enabled by typing "log on", the idle session time out feature is disabled.
View or configure management server settings	**mgmt** – To view the current management server settings. **mgmt –a ""** – To clear the active management server setting. **mgmt -a MgmtServer** – To set the active management server, where *MgmtServer* is the hostname or IP address of the active management server. This setting is active when the 'dhcpconfig' mgmt_server field is not specified. **mgmt –s ""** – To clear the current web status server settings. **mgmt –s WebStatusServer** – To set the web status server(s), where *WebStatusServer* is the hostname or IP address of one or more web status servers (up to five may be specified, separated by semi-colons). This setting will override values from DHCP option 72. **mgmt –c ""** – To clear the active Novanex management server setting. **mgmt -c ontimelistener.inovasolutions.com** – To set the active OnTime Management server, currently located at the indicated URL. This setting is active when the 'mgmt -o' DHCP option number is specified as zero (0) or when the OnTime Management DHCP 'cloudserver' setting is not specified. **mgmt –t ""** – To clear the clock management token field. **mgmt –t Token** – To set the site identity token, where *Token* is your clock registration token assigned by Novanex. This setting is active when the 'mgmt -o' DHCP option number is specified as zero (0) or when the OnTime Management DHCP 'sitetoken' setting is not specified. **mgmt –o xxx** – Use DHCP to request a configuration string for OnTime Management settings, where *xxx* is the DHCP option number. Specify the DHCP option number as zero (0) to disable requesting OnTime Management settings from DHCP. The factory default is 231.
List all TCP connections	**netstat** - List all TCP connections to and from the clock.
Display info to diagnose DNS problem with SNTP server	**nslookup SNTPServerName** where *SNTPServerName* is the hostname or IP address of an SNTP server.

| Condition	Solution
Reboot the clock	**reboot**
Update clock firmware	Refer to the OnTime FAQ on the support site

Table 12: Configuration Commands

Appendix B: Configuring DHCP Options for Microsoft Servers

This section details how to configure options on a Microsoft DHCP Server, such as the one that is bundled with Windows 2003 Server. It is for reference only and may not represent the specific options that you may encounter.

1. Launch the DHCP Management Console.

2. Select the DHCP Server to configure.

3. Choose the Action "Set Predefined Options…"
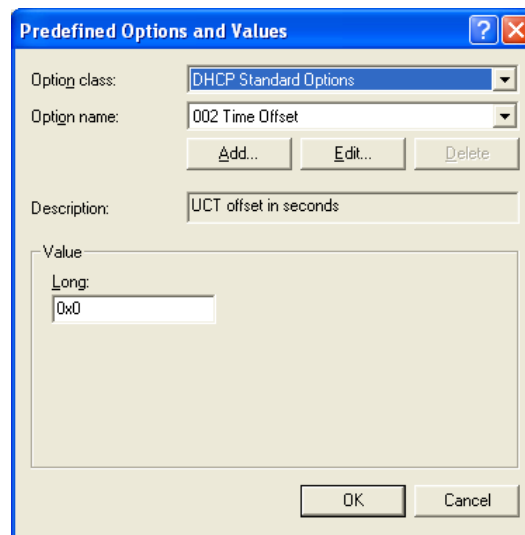
4. Choose "Add…" a new option.
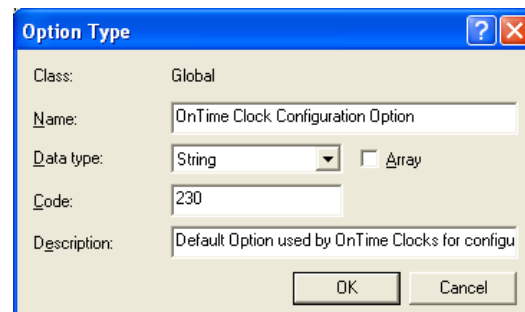
5. Set the Data type to 'String'.

6. Use the option code that matches your clock configuration. The default option code is 230.

7. Select either the Server Options or Scope Options and choose "Configure Options…".

8. Select the Option in the list and select the checkbox to enable it.

9. Enter the configuration string you've developed for your unique operating environment and geographic location.
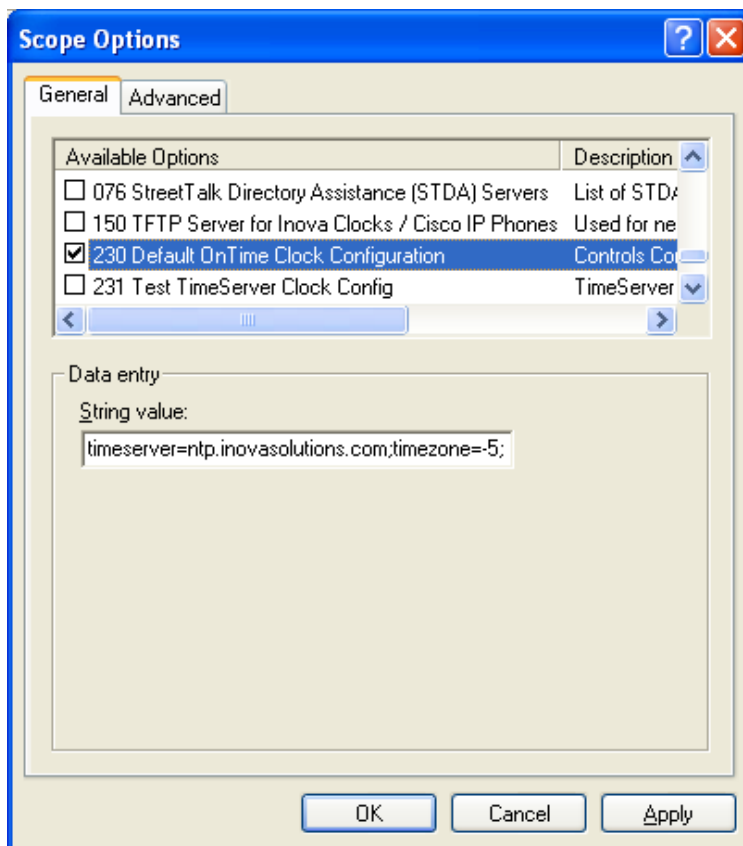
Appendix C: Clock Management System Support

Clock Management Systems. A clock management system collects status from clocks and provides options for managing a collection of clocks. The mgmt commands (Section 6) and associated DHCP options (see Appendix A: Clock Configuration) specify how to configure clocks to communicate with a management system.

Clock Network Information Packet. In order to assist management systems in the task of locating clocks on a network, the clock configures a Clock Network Information string comprised of the MAC Address and the IP Address of the clock in this form:

- eth=00:60:35:09:7b:ca; ipv4=192.168.1.5;

This Clock Network Information Packet is transmitted at power up and whenever the IP Address of the clock is changed, regardless of whether DHCP or Static IP Addressing is used. The transmission is a subnet broadcast that is sent to port 1601.

Management System Identification. To further improve the capability of a management system to locate clocks on the network, the DHCP option configuration includes a 'mgmtaddr' option. This can be used to specify a hostname or ip address and an optional port number. If specified, the Clock Network Information Packet will be also be transmitted to the specified address via unicast, in addition to the broadcasts described above.

Supported formats for the 'mgmtaddr' option include:

- mgmtaddr=192.168.1.1;

- mgmtaddr=host.network;

- mgmtaddr=testserver:1700;

OnTime Management System Packet. When the clock is configured for OnTime Management support, the clock will send to the configured cloudserver address a status packet listing the clock's ethernet (MAC) address, fully qualified hostname, IP address, clock model, firmware version, clock registration token, and the current NTP synchronization status.