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Novanex PoE Clock®
Installation and User Guide

Firmware version 2

Novanex PoE Clock

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Firmware Version 2

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Part Number: 715482

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1. Novanex PoE Clock Introduction

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

PoE technology 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 Novanex PoE 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 https://support.novanexsolutions.com. This website provides:

- Answers to frequently asked questions
- Firmware updates and release notes
- Access to the Clock Monitoring System to monitor your clock status

1.1. Clock Identification

This manual applies only to the current firmware version of the Novanex PoE Clock, known as firmware version 2. Refer to the table below to determine which model you have. If you find that you have version 1 cloock, please refer to the Novanex support site (https://support.novanexsolutions.com) for the version 1 manual.

PoE Clock	Version 2	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 a Novanex PoE 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.

- This clock is PoE only and does not require a battery. A battery may result in battery corrosion or leakage and damage to components. Forcing in a battery will void your warranty.

3. Technical Specifications

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

Table 1: Technical Specifications

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 (30.5 meters)	150 feet (45.7 meters)	150 feet (45.7 meters)
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 /at compliant Single sided: 3W Double sided: 4W	PoE, IEEE 802.3af /at compliant 8W actual consumption	PoE, IEEE 802.3af /at compliant 9.5W actual consumption
Dimensions	*Single sided:* 12 $^3/_4$" diameter x 1 $^7/_8$"D (29.5 cm x 5.1 cm) *Double sided:* 12 $^3/_4$" diameter x 4"D (29.5 cm x 10.8 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:* 1.6 lbs (0.73 kg) *Double sided:* 7 lbs (3.2 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/Recessed 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	Three (3) years, returned to factory. *Refer to Section 9 for warranty details.*		

4. Installation

4.1. Pre-Installation

Before installing any clock, you should:

- Obtain all necessary permissions from facilities managers or property owners.
- Develop a LAN diagram showing the desired location of each 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 Novanex PoE 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 the Novanex PoE Clock Store (https://www.novanexsolutions.com) 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).
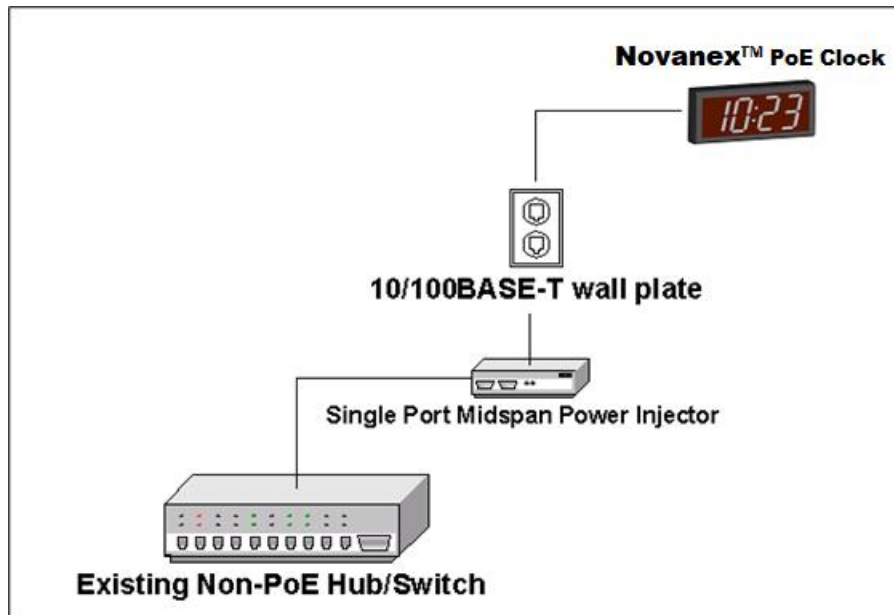
Figure 1: PoE Cabling Plan

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 Novanex PoE Clock. The Novanex PoE 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 Novanex PoE Clock Store (https://www.novanexsolutions.com) 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 Novanex PoE 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 1″ (2.54 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.
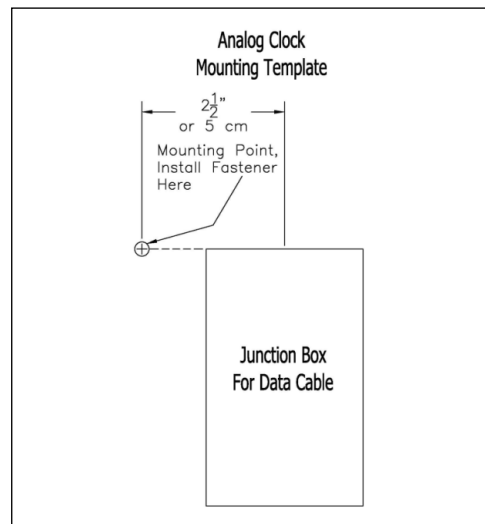
Figure 2: Analog Clock Mounting Template

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 $^1/_8$″ (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 Novanex PoE 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 a solid masonry type junction box and to hold the weight of the double sided clock.

2. Mount a solid masonry junction box, two gang size, (item 1 in Figure 3) to the stud or post in accordance with local regulations.
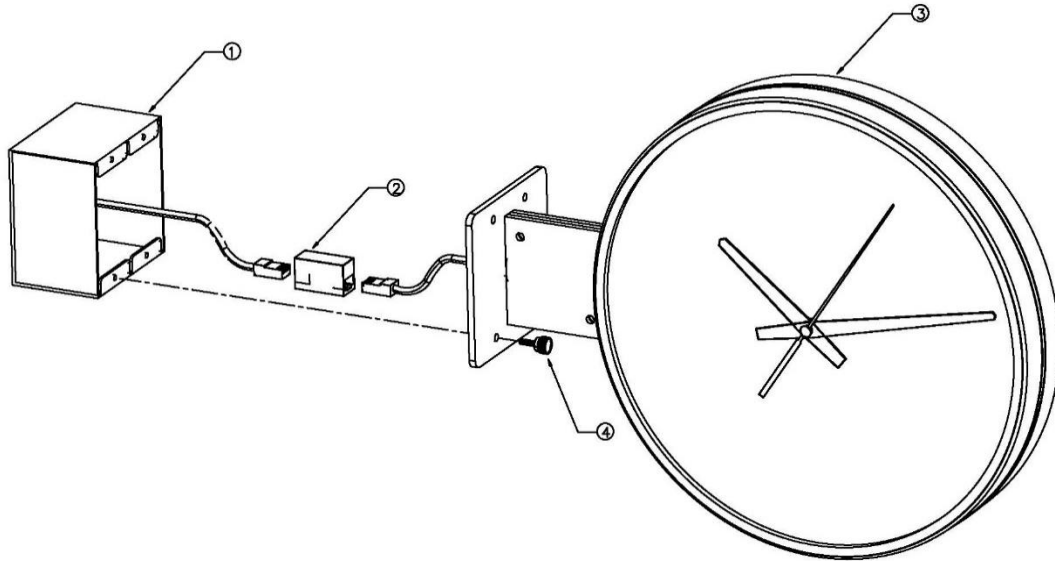
Figure 3: Analog Clock Double Mount Assembly

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

4. Plug the data cable into the connector (item 2 in Figure 3).

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

6. For ceiling mount applications, the orientation of the clocks can be corrected by gripping each clock face one at a time and rotating approximately 15° counterclockwise so that it comes free. Then, turn the clock to the desired orientation and reinstall it by rotating in clockwise until you feel the detent.

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 4 and Figure 5 to ensure that you line the wall jack up with the recess in the back of the unit.
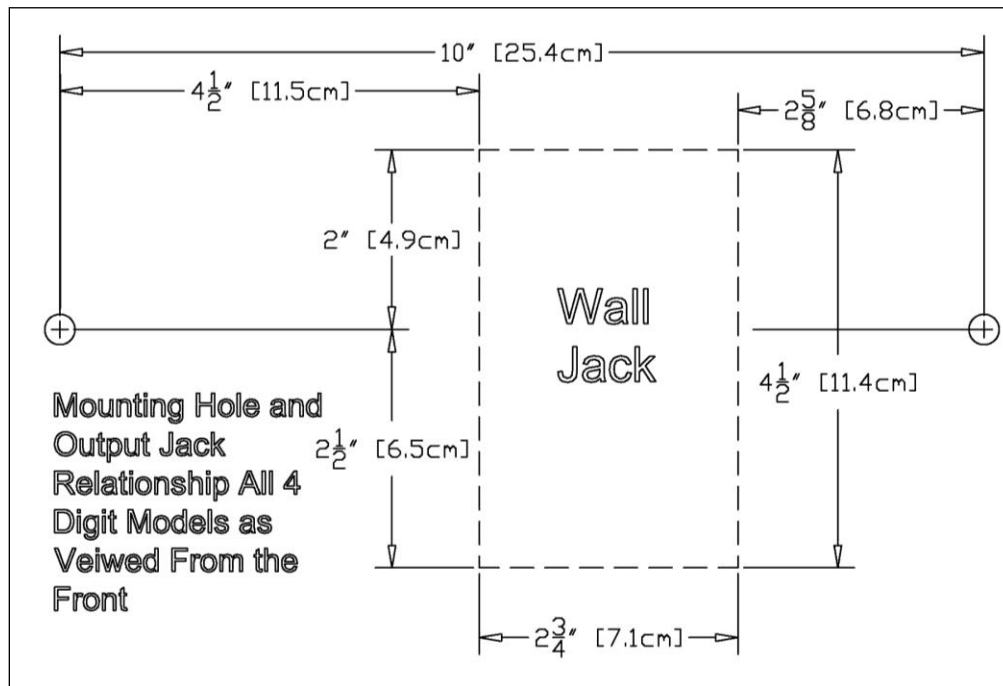
Figure 4: Mounting Template for 4-Digit Clocks
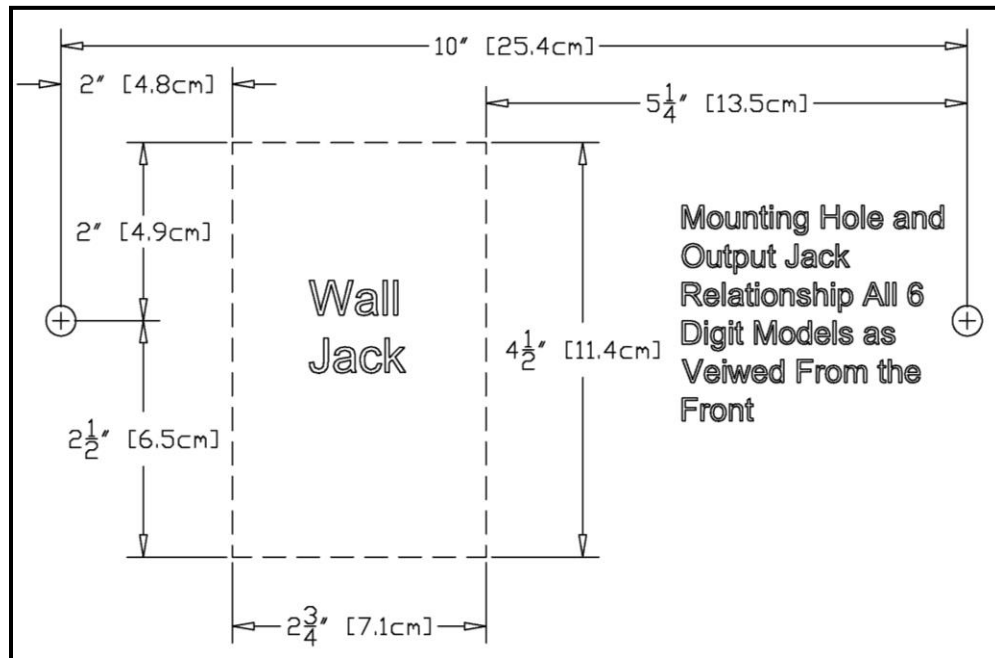
Figure 5: Mounting Template for 6-Digit Clocks

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 Novanex PoE 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.
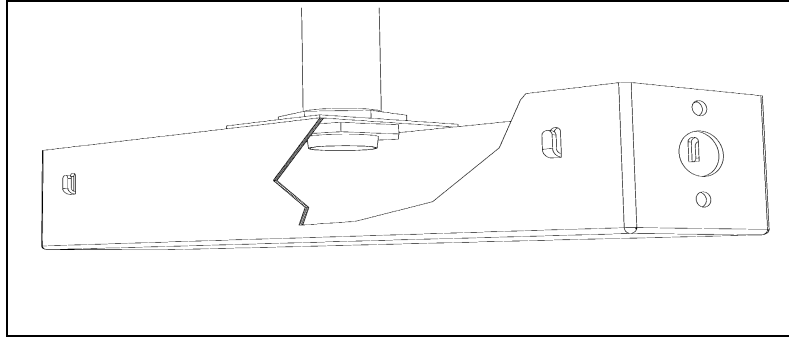
Figure 6: Digital Clock Pendant Mounting

1. Determine the clock mounting location.

   Note: The illustration above suggests a recommended mounting means for a pendant mount of one or more Novanex PoE 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 the Novanex PoE 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 – Double Sided

The following is a recommended procedure for cantilever mounting. This procedure requires a cantilever mounting kit (either ONT4KIT-W or ONT6KIT-W).
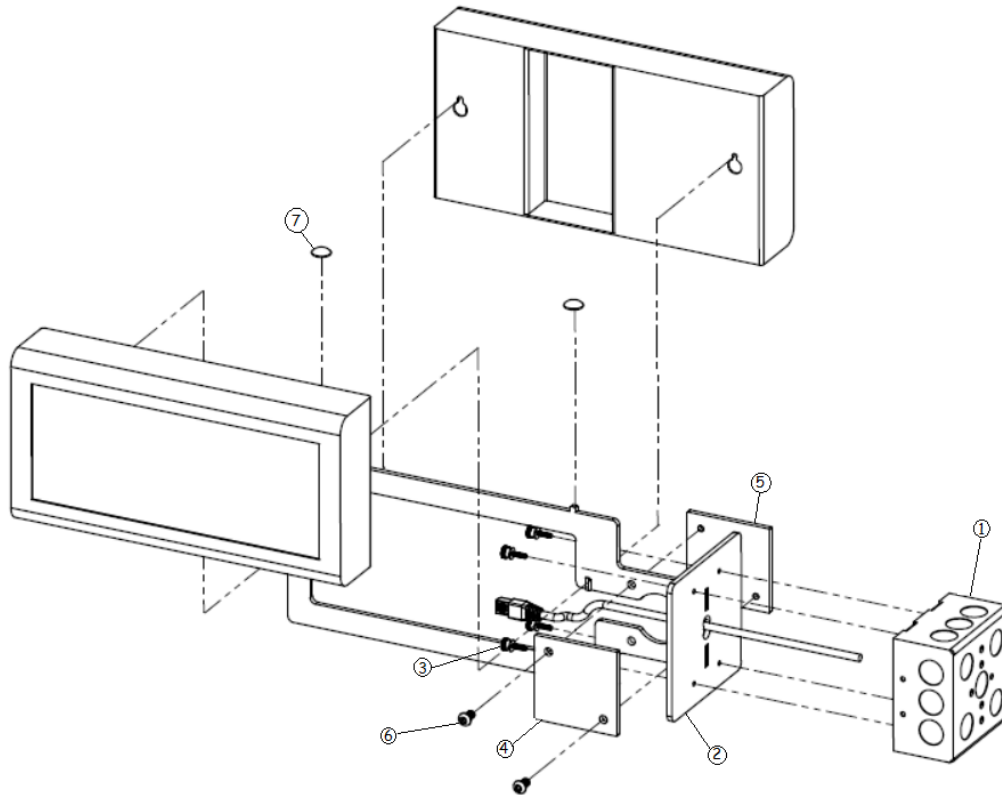
Figure 7: Digital Clock Cantilever Mounting

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

2. Mount a solid masonry junction box, two gang size (item 1, Figure 7), to the stud or post in accordance with local regulations.

3. Route the 2 data cables to the junction box in accordance with local regulations, then route the data cables though the hole in the back of the mount (item 2, Figure 7). The 4 digit clocks will require at least 12"(30.48cm) once through the hole and the 6 digit clocks will require at least 18"(45.72cm).

4. Attach mount (item 2, Figure 7) to the junction box using thumbscrews (item 3) provided.

5. Attach cover plates (items 4 and 5, Figure 7) with screws (item 6) using 5/32" allen wrench (provided).

6. One at a time, insert a data cable into the RJ45 jack locted in the rear of each clock. Any excess cable can be stowed inside the well in the back of the clock.

7. Position the keyhole slots located on the rear of the clock on the hanger hooks located on the mount.

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

9. Install the 2 retention fasteners (item 7, Figure 7) to secure the clocks to the mount.

4.9. Flush/Recessed Mounting the Digital Clock

The Flush/Recessed mounting feature of the Novanex PoE 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/Recessed 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	Horizontal Dimension	Vertical 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 refer to the template provided in *Figure 8 and Figure 9*. This will help ensure that the opening is square as well as the proper size and in the correct location.
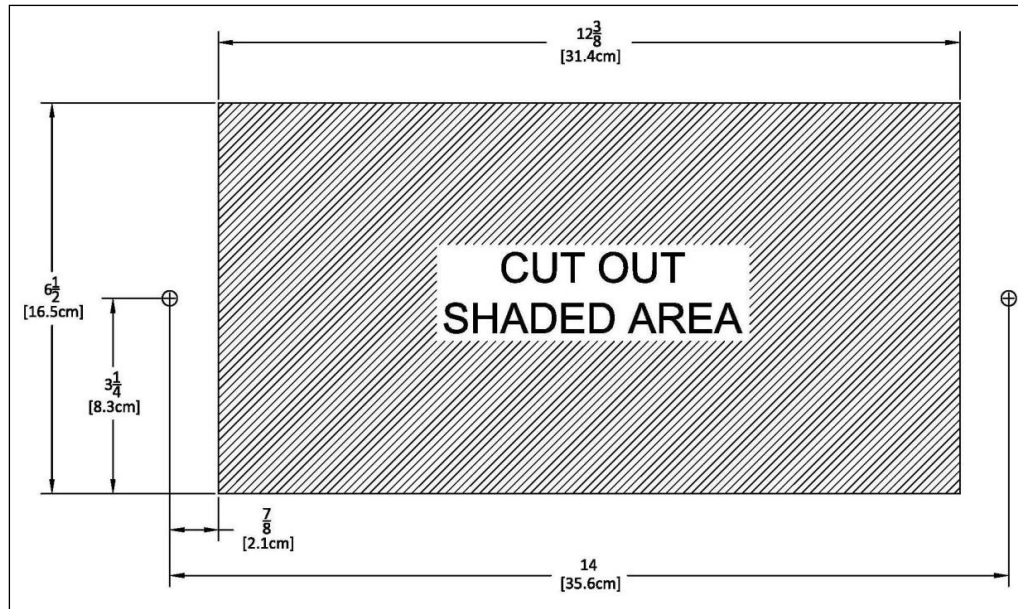
Figure 8: Cut-out Template for 4-Digit Clocks
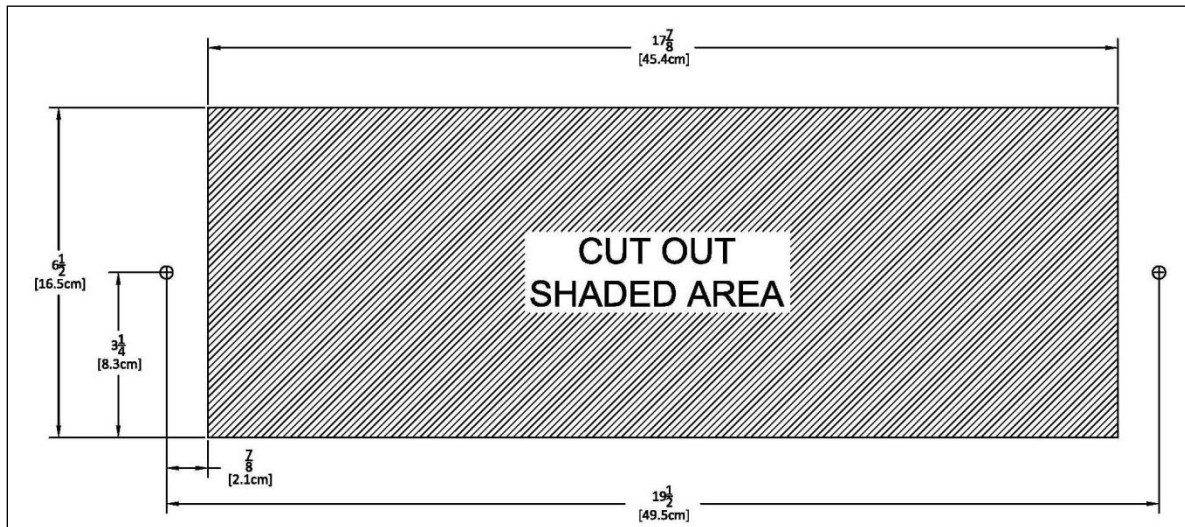
Figure 9: Template for 6-Digit Clocks

3. Refer to the template provided and 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 10. The clock is now ready for installation.
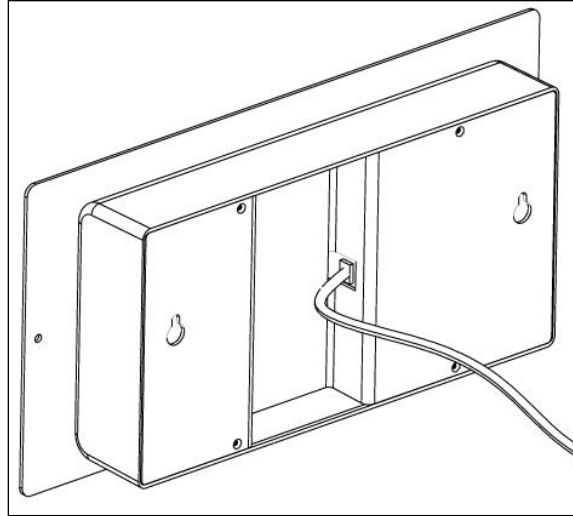
Figure 10: Data Cable Installation

8. Place the clock with flush/recessed mount assembly in the hole and re-install the screws, as seen in Figure 11.
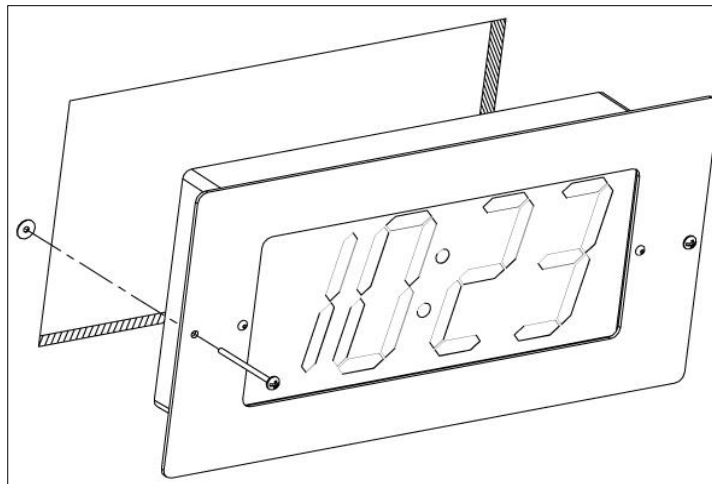
Figure 11: Clock With Flush/Recessed Mount Assembly

4.10. Power Up and Verification

Once the installation is complete, power up the units by connecting them to a PoE enabled Ethernet LAN. The clocks will follow the power up sequence described in Figure 12. *Note that the center column includes two possible scenarios where the power up sequence could stall for the clock.*
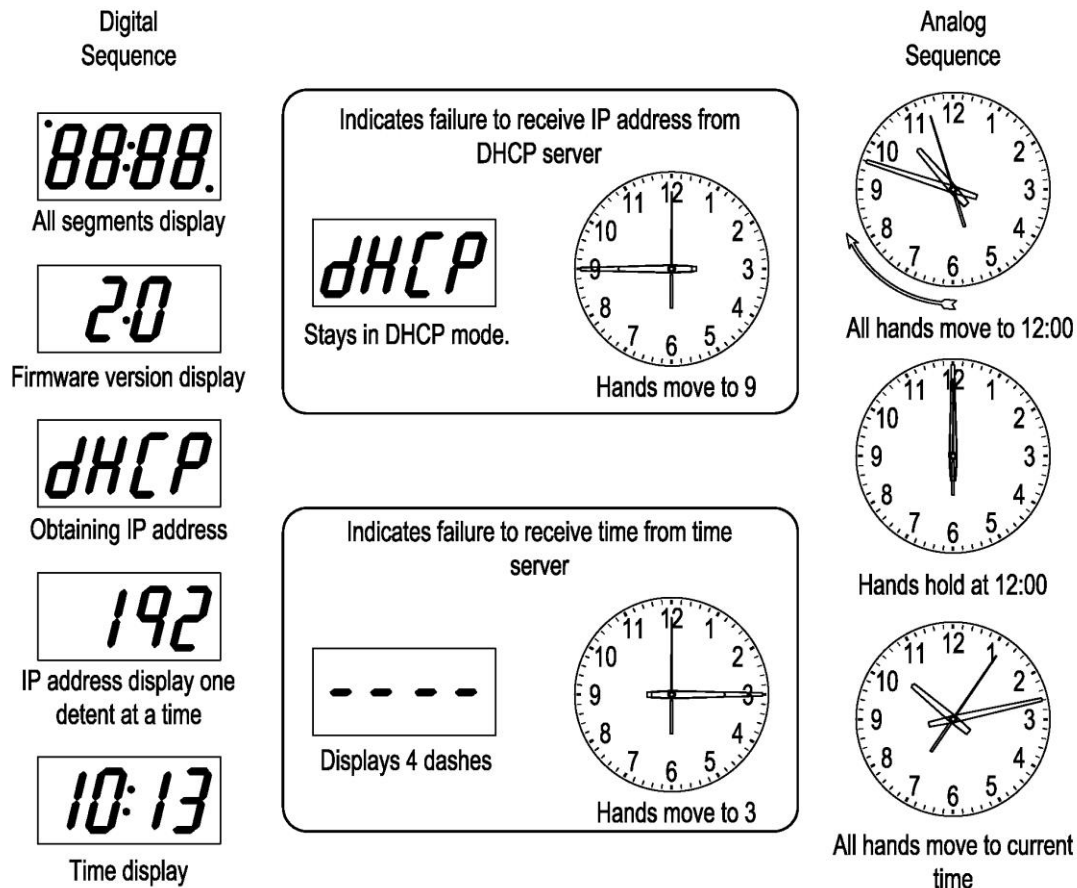
Figure 12: Power Up Sequence

Note that the Analog clock has three "home" positions to which it will move at the start of the power-up sequence: 12:00:00, 4:00:00, and 8:00:00. Only the 12:00:00 position is shown in Figure 12, above.

4.11. Status Indicators

The digital clock has two status indicator dots; see figure 13, below. The upper left dot indicates AM or PM; the lower right dot is the "service light," and indicates loss of time sync or active Telnet session. The analog clock uses its hands to indicate an anomalous condition, as seen above for the DHCP and Time Server issues at boot. In addition, the

analog clock will place the seconds hand at five seconds after the top of the minute to indicate it has lost synchronization with the time server after an initial successful time synchronzation.

The digital clock will light up the AM/PM indicator when so configured and the time is past 11:59:59 AM (see Section 6.2 and Appendix A, Clock Configuration, for configuring it). The digital clock will turn on the service light when it has lost synchronization with the time server. However, when there is an active Telnet session, the service light will blink, overriding the time synchronization status. This is because when logged in to the clock one can determine the time synchronization status.
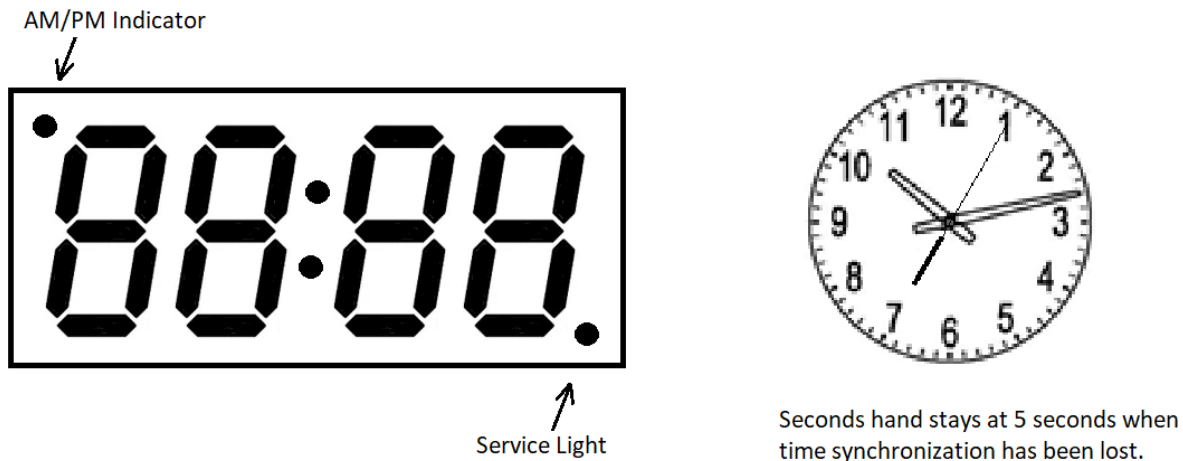
Figure 13: Clock Status Indicators

5. Configuration

Table 3 describes all of the configuration options for the Novanex PoE Clock. The recommended configuration method is to add private options to the DHCP server so that all the clocks can be configured and reconfigured quickly and easily. (See Section 6.) Because Telnet is an open/clear-text protocol, some organizations disallow it on their networks. The "disabletelnet" command is used to prevent the clocks from connecting via the telnet protocol; a factory reset is required to restore Telent connectivity.

	Configuration Option	Automatic Configuration (See Section 6)	Manual Configuration (See Section 7)
Network Parameters	*These settings allow the clock to be part of the local network*		
	IP Address	DHCP	Telnet
	Subnet Mask	DHCP Standard option 1	Telnet
	Default Gateway	DHCP Standard option 3	Telnet
	DNS Server	DHCP Standard option 6	Telnet
Time Parameters	*These settings allow the clock to access and display network time.*		
	Time Server, primary	DHCP Private option 230	Telnet
	Time Server, secondary	Telnet only	Telnet
	Time Zone	DHCP Private option 230	Telnet
	Daylight Savings Time (DST)	DHCP Private option 230	Telnet
	Digital Clock, 12/24 hour time	DHCP Private option 230	Telnet
	Digital Clock, show/hide colon	DHCP Private option 230	Telnet
Management Parameters	*These settings allow a user to monitor the clocks and set up alerts from the support site (https://support.novanexsolutions.com).*		
	cloudserver	DHCP Private option 231	Telnet
	sitetoken	DHCP Private option 231	Telnet

Table 3: Configuration Options for the Novanex PoE Clock

5.1. Network Parameters

The IP Address, Subnet Mask, Default Gateway and DNS Server parameters are required so that the clock can communicate on the network. These parameters are set automatically if you use DHCP.

5.2. Time Parameters

- 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.

The 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 Novanex PoE Clock must be configured with the network location of at least one time server; the Novanex PoE 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 generally prefer not to have individual clocks connecting to the Internet. Your IT group should specify a local NTP time server or router to be the primary and optional secondary time servers with which to synchronize the clock.

5.3. Management Parameters

Novanex offers the Clock Monitoring service through our support site to assist in management of your clock system. This service is available to registered customers and is described at the [Novanex support site](#) on the *Novanex PoE Clock Monitoring* product page (https://support.novanexsolutions.com/products/novanex-clock-monitoring-system/). This service allows you to monitor your clocks and to set up email alerts to be notified of problems with time synchronization.

There are two management parameters to set on the Novanex PoE Clock: *cloudserver* and *sitetoken*. These parameters can be set on the clock (*refer to Appendix A: Clock Configuration*) or via a DHCP server option code using the *mgmt –o <option code>* command (*Refer to Section 0*).

- **cloudserver** – Set using the *mgmt –c* command. This parameter tells the clock where to send its status information; set this parameter to *ontimelistener.novanexsolutions.com*, which is the Domain Name for the Clock Monitoring service.
- **sitetoken** – Set using the *mgmt –t* command. This Clock Token parameter tells the Clock Monitoring system the organization to which this clock belongs and under which its status will be reported. Before you start to register your clocks, retrieve your unique Clock Token from the Clock Account Information popup of

the My Clocks page at the support site. Refer to the support site FAQs for more detail (https://support.novanexsolutions.com).

5.4. Modifying the Configuration

The recommended configuration method is DHCP-based (*refer to Section* 6), where many of the configuration settings are automatically served to the clocks from the DHCP server. In this case, modifying the clock configuration is done at the DHCP server.

If you are using DHCP, but not a DHCP private option code (e.g. option 230) to more fully configure your clock, the network parameters are usually set by the DHCP server. Log on to your clock using Telnet; see Section 7 for details.

If however you have manually modified the clock configuration, and have assigned your clocks static IP addresses, use the steps below to connect to your clocks and alter the configuration or to recover a factory fresh clock configuration.

5.4.1. Digital Clock

The digital clock displays its IP address on start up. Follow the instructions for connecting to a clock via telnet in this manual (Section 7) and reconfigure the clock.

5.4.2. Analog Clock

The analog clock has no IP address display on startup; if a static IP address has been used, it will be unknown by simply looking at the clock. Here are ways to obtain the assigned static IP address for the clock so that you can reconfigure the clock.

- If the monitoring system is in use (recommended), check the support site "My Clocks" page (https://support.novanexsolutions.com/clock-management/) to see the static IP address that will be shown. Note that if the clock is configured for DHCP service, the monitoring system will only show the clock hostname, not its IP address.

- Work with your IT team to determine all the clocks on the network by their MAC addresses, which begin with "00:30:d1". A process of elimination using the switch ports can help determine which IP address is associated with which clock.

Alternatively, one use the clock hostname to find its IP address – ping the hostname or review the DHCP leases for hostname or MAC address. If the hostname is unknown, one can return the clock to factory default settings (see Appendix A, Configuration).

- After a reset to factory default settings, the clock Host Name can be used once a new IP address is served by a DHCP server, or you can boot the clock in a lab setting, also called a bench environement, and use the default IP address (169.254.0.100) to connect to the clock.

- For the bench environment, set up a PC that is not connected to a network but for which the PC is set to obtain an IP address automatically (DHCP) – this will fail and the PC will set itself to an APIPA address. Connect the clock to this PC with a PoE switch or a PoE injector, and four minutes after the clock boots, a Telnet client on the PC can connect to the clock at its default IP address (169.254.0.100).

6. Automatic Configuration Using DHCP

6.1. Overview

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 224 to 254 are available for use for site-specific purposes. The Novanex PoE Clock takes advantage of the DHCP option slots to enable plug and play installation of clocks. The Novanex PoE Clock is preset to request its local configuration from the DHCP server using DHCP option 230. When option 230 is set up on the DHCP server with a valid configuration string, the clock will 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 all at once at the DHCP server.

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

The Simplex PoE clock can be configured to use different DHCP private option numbers through its Telnet interface.

DHCP server changes are typically made by the IT group.

6.2. DHCP Configuration Settings

The Novanex PoE 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 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. When set to 24-hour time, the AM/PM indicator and the colon are disabled.	✓	*No effect*
Show/hide colon	Determines whether the colon is shown on the clock. 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: Clocks will retrieve the DHCP option strings periodically, including when the clock reboots and when the DHCP lease is renewed; these will automatically be applied.

6.4. Creating a DHCP Configuration String

Table 5 describes the five settings 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. Any of these five options can be left out of the configuration string, in which case the local setting from the clock configuration will be used. This string is added to the DHCP server, as described in the next section.

Option Name	Option Value	Configuration Setting	Description
timeserver	NTP Time Server domain name or IP address	NTP Primary Time Server domain name or IP address (sntp –h command)	Sets the Primary NTP Time server domain name or IP address to use for time synchronization. If a domain name is used, then the DHCP server must also provide a DNS server address to use to resolve the domain 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 and are valid only in 15-minute increments (i.e., :00, :15, :30, and :45).
dst	None or 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 indicator; otherwise it uses 12hour time format and enables the AM/PM indicator.
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.

Table 5: DHCP Private Option 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 Novanex PoE Clock via telnet and issuing the **sntp –e** *command (see Section 7.3).*

Table 6 provides examples of the configuration string.

Command	Description
timeserver=ntp.novanexsolutions.com; timezone=-5; dst=-1 8 2 2 1 1 10 2	• Sets the primary time server to ntp.novanexsolutions.com • Sets the time zone to USA Eastern Time Zone (-5 hours from UTC) • Enables DST for US 2007 rules
timeserver=10.1.128.1; timezone=0; dst=none	• Sets the primary time server to IP address 10.1.128.1 • Sets the time zone for Western European Time Zone • Enables DST for EU 2021 rules (no DST changes)
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 and sets the clock to 24 hour mode (disabling the AM/PM indicator) • Sets the time zone to Eastern Standard Time (-5) • Enables DST for US 2007 rules
Other locations	The Novanex support site (https://support.novanexsolutions.com/dst-calc) provides a DST calculator which can compute the correct DST configurations string for your location. Input your location's DST rule to obtain the DST settings string and set your clock's DST configuration with the command `dst -rule` (`dst -raw` also works).

Table 6: Examples of Common DHCP Configuration Strings

6.5. Clock Monitoring Settings

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

Option Name	Option Value	Description
cloudserver *(analogous to the mgmt –c command – see Table 14)*	ontimelistener.novanexsolutions.com	Sets the Clock Monitoring server Domain Name to *ontimelistener.novanexsolutions.com*. The clock configuration must include a DNS server to use to resolve this Domain Name (ipconfig –p command or DHCP option 6).
sitetoken *(analogous to the mgmt –t command – see Table 14)*	Your Novanex PoE Clock Token	Sets the token representing the site to which the clock belongs; for use by the Clock Monitoring system. The token is a 12-digit text string sent to you via email during the registration process; it is also available on the My Clocks support site page, (https://support.novanexsolutions.com/clock-management/).

Table 7: Clock Monitoring Properties

Table 8 contains a sample Clock Monitoring configuration string.

Command	Description
cloudserver=ontimelistener.novanexsolutions.com ; sitetoken=0rhso7006256	Sets the display to send its info to ontimelistener.novanexsolutions.com with its organization token as 0rhso7006256

Table 8: Example of Clock Monitoring Configuration String

6.6. Setting Different a DHCP Option Number on a Clock

You do not have to use DHCP configuration options 230 and 231 for the clocks. 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 224-254 (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. Configuring the Novanex PoE Clock settings via DHCP can be disabled by setting ipconfig –o command on the clock to 0 (zero). The ipconfig command is defined in Appendix A.

The Clock Monitoring settings can be configured via any DHCP option number in the range 224-254, except for that being used for the other clock settings, by using the **mgmt –o** command on the clock. Configuring the Clock Monitoring 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.

Note: When changing the DHCP private option codes for either timekeeping properties or Clock Monitoring settings, the clock will automatically read the new settings from the new DHCP private option codes without requiring a reboot; however, this process will take a few minutes. It is usually faster to reboot the clock to force it to read the new option codes you have set.

6.7. Verifying the DHCP Configuration Settings on a Clock

The **dhcpconfig** command lists all the configuration settings that were retrieved by the clock from the DHCP server and that are currently in effect. If the clock cannot validate any of the five settings retrieved from the DHCP server, it will ignore just those invalid settings, which will be shown as empty strings in the **dhcpconfig** 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.novanexsolutions.com
Time Zone    : -5
DST Rule     : -1 8 2 2 1 1 10 2
```

Notes:

- A clock can be re-booted to request a new configuration string from the DHCP server. The clock will automatically request a new configuration string within a few minutes of changing which DHCP option to request; in addition, the clock will request the configuration string at the expiration of each DHCP lease interval.

- If option 230 (or an alternate option code specified on the clock) is not configured on the DHCP server, the clock will receive an IP address in the usual fashion but the settings for Time Server, Time Zone, DST, etc. will come from the clock's internal configuration (i.e., the settings set via command line in a telnet session or, if none, then the default settings from the factory configuration).

6.8. DHCP Configuration Example for Microsoft Server

Appendix B: Configuring DHCP Options for Microsoft Servers contains an example of how to configure private 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. Manual Configuration Using Telnet

Clocks can be individually configured using a telnet session, though DHCP configuration is simpler and recommended. 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 FAQs on the support site for more configuration assistance (https://support.novanexsolutions.com).

7.1. Establishing a Telnet Connection to the Clock

To establish a telnet connection to your clock, you must first have the Host Name or IP address. The Host Name from the factory is *iclock-###* where ### is the last three characters of the MAC address shown on the label attached to the clock when it ships. For example, a clock with a MAC address of 00:30:D1:00:70:2F has a Host Name of iclock-02f. Note that capitalization does not matter in MAC addresses or hostnames.

If you are not using DHCP to assign IP addresses to your clocks, then it is likely that your clocks' hostnames have not been registered with your DNS server. In this case you may have to connect to your clocks with their IP addresses. You may substitute the clock's IP address for its Host Name in the steps below to telnet into your clocks. See Section 5.4 for ways to recover IP addresses for your clocks.

Once you have the Host Name for your clock, you can 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** [hostname]. *Refer to the note above to determine the Host Name of your clock*.

   Note: Windows users may need to change the default windows configuration in order to enable 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-### />)`

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 two options for configuring an IP address to each Novanex PoE Clock:

- DHCP [Factory Default]
- Assigned Static IPv4 Address

7.2.1. DHCP

The factory default is DHCP. Refer to Section 6 for more information about DHCP. Refer to *Appendix A: Clock Configuration* for help changing from a Static IP address to DHCP by using the *ipconfig –d* command.

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.

You may also have to specify a primary DNS server; if possible, you may also wish to specify a secondary DNS server. In order to sync to an internet time server (see below) you will need to specify at least one DNS server by IP address.

To enter the primary and secondary DNS servers while also configuring a static IP address, start a telnet session with the clock and use the following command option:

```
ipconfig -a xxx.xxx.xxx.xxx -m yyy.yyy.yyy.yyy -g zzz.zzz.zzz.zzz
-p vvv.vvv.vvv.vvv -s uuu.uuu.uuu.uuu
```

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

- $vvv.vvv.vvv.vvv$ is the primary DNS server IPv4 address

- $uuu.uuu.uuu.uuu$ is the secondary DNS server IPv4 address

In order to make the management of your system as easy as possible, Novanex strongly 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 9: IP Address Reference Table

7.3. Specifying a Primary or Secondary Time Server

Specify by IP address or Domain Name the primary and secondary network time servers on the LAN, WAN, or Internet with which the Novanex PoE 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 a time server on the Internet, it is usually more appropriate to use the Domain Name.

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

  – If IP addressing is static, the DNS servers must be identified and configured by IP address as well.

  – If 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 Domain Name and IP address.

1. Log into the Novanex PoE 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. (You need a space between the command name and the time server Domain Name/IP address.)

4. Enter the Domain Name or IP address of the time server.

5. Press the Enter key to submit the time server configuration.

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 at the support site (https://support.novanexsolutions.com).

7.4. 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, -12:45 to 12:45.

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.

Note: The timezone command allows for a minutes offset specification as well as hours. This is only needed in a few timezones around the world, if you do not need a minutes offset, there is no need to specify the colon or minutes (as *':00'*) . For example, the specification of Paris, France's timezone would look like this:

```
timezone 1
```

7.5. 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 (2007 rule)	Type: **dst -rule -1 8 2 2 1 1 10 2** Press the Enter key.
For European Daylight Saving Time (in 2021 the EU made it optional)	For no DST transitions, enter: **dst –none** For the typical EU DST rule: **dst -rule 1 -1 2 1 1 -1 9 2**
Other locations	The Novanex support site (https://support.novanexsolutions.com/dst-calc) provides a DST calculator which can compute the correct DST configurations string for you location. Input your location's DST rule to obtain the DST settings string and set your clock's DST configuration with the command *dst –rule* (*dst -raw* also works).

Table 10: Configuration for Daylight Saving Time

7.6. Configuring Other Settings

Three additional time related configuration items can also be specified; for example, 12/24 hours display, AM/PM indicator, and Colon Separator On/Off. *Appendix A: Clock Configuration* describes these commands.

8. Troubleshooting

Table 11 and Table 12 contain several trouble conditions you may encounter with the Digital and Analog Novanex PoE Clocks and the recommended actions to take to correct the problems. The up-to-date troubleshooting help is available in the FAQs on the support site (https://support.novanexsolutions.com).

Condition	Solution
The Digital Clock face 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 10 seconds for the clock to light up the LEDs on the clock face.
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 "service light" topics below).
A 'dhcp' message shows on the Digital Clock face for about 4 minutes after booting up.	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 default IP address for diagnostic or re-configuration purposes while the bottom right service light is on. The default IP address is 169.254.0.100.
The Digital Clock 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 is not present on the Analog Clock.
The Digital Clock 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 clock. If the 'dhcp' message is displayed, the service light signals that the clock can be reached by its default IP address (169.254.0.100) when connected to a PC that has an APIPA address (i.e., is set for DHCP service but has no DHCP available).
Determine the IP address of a Digital Clock	a)reboot the clock with the "reboot" command at a Telnet prompt, or b)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 for the IP address. Record the IP address and location.
Digital Clock Face showing '- - - -'	The Time Server is either not properly specified or is unreachable. This can also happen when the digital clock binds its default IP address (169.254.0.100) after about 4 minutes without DHCP service.

Table 11: Troubleshooting the Digital Novanex PoE Clock

Condition	Solution
The Analog clock hands do not move when power is applied.	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 hands to begin moving.
The Analog clock hands are stuck at 9:45:00.	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 default IP address (169.254.0.100) between DHCP retries with a PC that has an APIPA address (i.e., is set for DHCP service but has no DHCP available).
The Analog clock hands are stuck at 3:15:00.	The Time Server is either not properly specified or is unreachable.
Determine the IP address of an Analog Clock.	The analog clock has no IP address display on startup so the IP address will generally be unknown. The recommended method to recover a static IP address is to view the My Clocks page on the support site (https://support.novanexsolutions.com/clock-management/); the IP address will be shown there if the monitoring system is in use. For DHCP-addressed clocks with DNS you can ping the clock's Host Name to see its IP address. Alternately, clear the clock configuration by resetting it to factory default settings.
Clear the configuration of an Analog Clock.	Return the clock to factory default by inserting a straightened paperclip into the small hole on the centerline of the rear of the powered clock and holding down the recessed pushbutton until the hands begin to find their home position (at least 15 seconds). The clock must be powered on for the reset to work. The IP address can be then served by a DHCP server or the default IP address (169.254.0.100) can be used in a lab setting with a PC that has an APIPA address (i.e., is set for DHCP service but has no DHCP available).
The clock is ticking and shows incorrect time.	If the minutes past the hour are correct, verify the Time Zone and Daylight Saving Time settings.
The DST transition does not occur immediately.	Analog clocks may require some amount of time to make the automatic adjustment to DST. The clock may continue ticking up to 3 minutes past the DST transition time before the hands begin fast stepping to the new time. It may take as long as 10 minutes for the hands to complete the transition to the new local time.

Table 12: Troubleshooting the Analog Novanex PoE Clock

9. Warranty and Maintenance

9.1. Warranty

Novanex warrants the Novanex PoE Clocks to be free from defects in material and workmanship during a three-year period. The Warranty begins on the date the unit is shipped.

The liability of Novanex under this Warranty is limited to repairing or replacing, at Novanex's 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. This Warranty does not apply if the clock case has been opened without authorization from Novanex.

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.

9.2. 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.

Novanex will not be responsible for dismounting and remounting of the Novanex PoE 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.

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.

10. Glossary of Terms

Terms	Definitions
Cantilever Mount	This is a wall mount to the left or right side of the Novanex PoE 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 translated into IP addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address.
Domain Name	The name of a device located on an internet and defined by a Domain Name Service. A domain combines the device host name and the domain in which the device resides. A domain name translates to an IP address for network communications.
Flush/Recessed Mounting	This model may be inserted into 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; see also Domain Name. 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, Part Number ONTKIT.
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 or GMT	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 13: 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- Manual Configuration Using Telnet . For additional support, refer to the [Novanex support site](https://support.novanexsolutions.com) (https://support.novanexsolutions.com).

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 –o 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 domain-name**, where *domain-name* is the Domain Name 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 domain-name**, where *domain-name* is the Domain Name 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 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.
	Europe (can vary by country) - Type: **dst -rule 1 -1 2 1 1 -1 9 1** Press the Enter key.
	Other Locations – The Novanex support site (https://support.novanexsolutions.com/dst-calc) provides a DST calculator which can compute the correct DST configurations string for you location. Input your location's DST rule to obtain the DST settings string and set your clock's DST configuration with the command *dst –rule* (*dst –raw* also works).
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 -12:45 to 12:45.
	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 *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 *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 *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 0 - Disable the configuration portion of the DHCP process.
	ipconfig -h hostname - To change the Host Name of the clock, where *hostname* is the new Host Name.
	ipconfig -b [on | off] - Set whether to show IP information at clock bootup. Note that the Analog Clock cannot display an IP address when it boots up.
	ipconfig -x - Show all Interface data.
	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 the name of the domain in which the clock resides.
	ipconfig -p IP - Set primary DNS address.
	ipconfig -s IP - Set secondary DNS address.
	ipconfig -t dnstimeout - Set DNS timeout (0 is valid).
View log on session screen	**log -** To view the log of events and actions.

| Condition	Solution
View or configure monitoring server settings	**mgmt** - To view the current clock monitoring settings. **mgmt –c** – To clear the active monitoring server setting. **mgmt -c ontimelistener.novanexsolutions.com** – To set the active Clock Monitoring 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 Clock Monitoring 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 ignored when the clock moitoring server domain name is provided by DHCP. **mgmt –o *xxx*** – Use DHCP to request a configuration string for Clock Monitoring settings, where *xxx* is the DHCP option number. Specify the DHCP option number as zero (0) to disable requesting Clock Monitoring settings from DHCP. The factory default is 231.
List all TCP connections	**netstat** - List all TCP connections to and from the clock. This command is currently not supported on Novanex PoE Clock v2 firmware.
Display info to diagnose DNS problem with SNTP server	**nslookup NTPServerName** where *NTPServerName* is the fully-qualified Domain Name of an NTP server or other target; for example, *ontimelistener.novanexsolutions.com,* to verify your clock has a route to the Clock Monitoring server.
Reboot the clock	**reboot**
Update clock firmware	**update UpdateServerName/UpdatePackageName**, providing the fully qualified Domain Name of the update server and the update package name. Refer to the FAQs at the [Novanex support site, https://support.novanexsolutions.com.](https://support.novanexsolutions.com) For example: `update clock.novanexsolutions.com/clock_v2_latest.hex`
Disable Telnet	Because Telnet is an open/clear-text protocol, some organizations disallow it on their networks. The "disabletelnet" command is used to prevent the clocks from connecting via the telnet protocol; a factory reset is required to restore Telent connectivity.

| Condition	Solution
Reset to factory default configuration settings	Note: The clock must be powered on for the reset to work. Digital Clock: Open the clock case (4 screws, best with the clock face up on a flat work surface); connect the ethernet cable, once the clock is fully booted, press the blue reset button and hold for 15 seconds until the clock face goes blank and the clock reboots. Analog Clock: With the clock powered up, insert a straightened paperclip into the small hole on the centerline of the rear of the powered clock and holding the down recessed button until the hands begin to find their home position (at least 15 seconds).

Table 14: Configuration Commands

Appendix B: Configuring DHCP Options for Microsoft Servers

This section details how to configure private 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…"
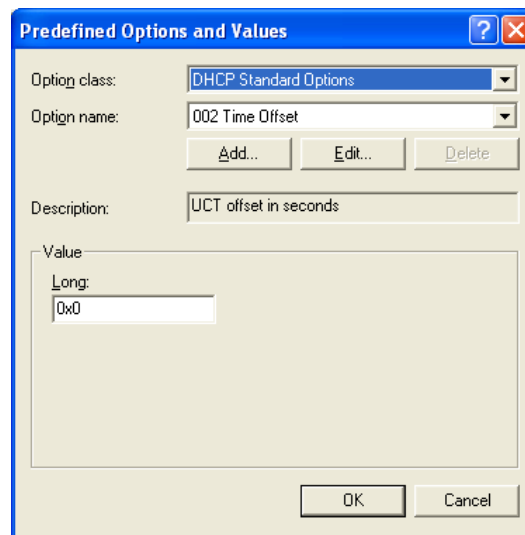
4. Choose "Add…" a new option.
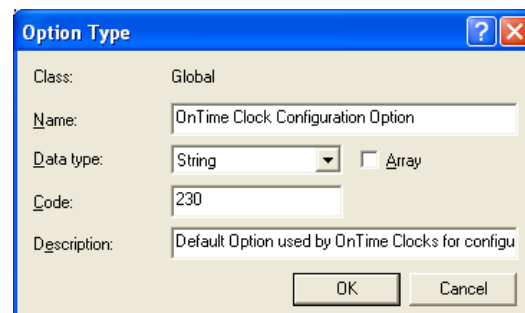
5. Set the Data type to 'String'.

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.
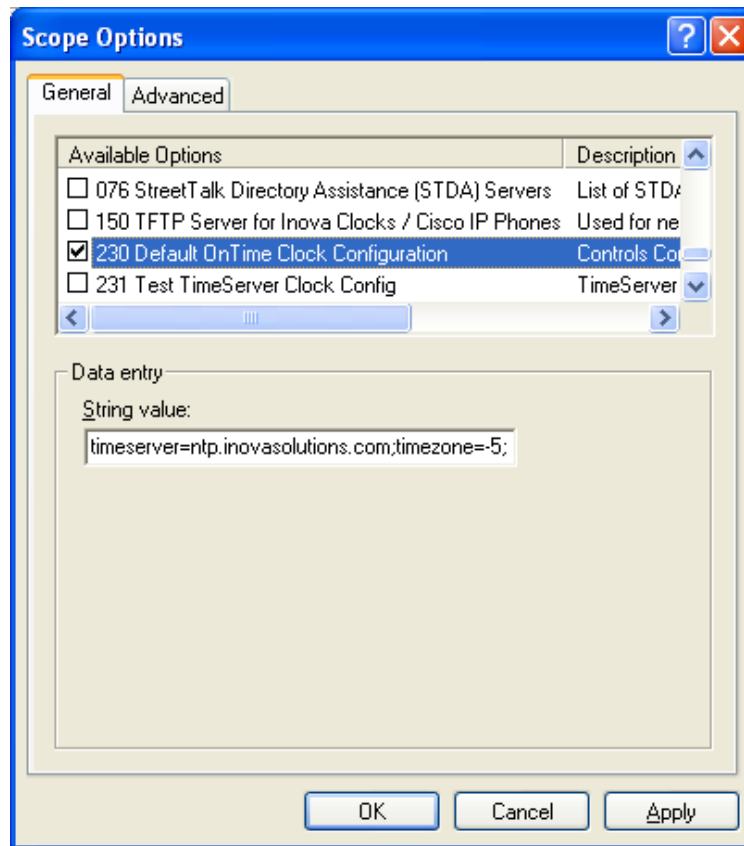
Appendix C: Clock Monitoring System Support

Clock Monitoring System. A clock monitoring system collects status from clocks and provides options for managing a collection of clocks. The mgmt command and associated DHCP options (see Appendix A: Clock Configuration) specify how to configure clocks to communicate with the Clock Monitoring system.

Clock Monitoring System Packet. When the clock is configured for Clock Monitoring support, the clock will, via http, send to the configured cloudserver address a status packet listing the clock's ethernet (MAC) address, Host Name, IP address, clock model, firmware version, clock registration token, and the current NTP synchronization status.