

Symmetricom IEEE 1588 Grandmaster (PTPv2) Quick Start Guide

The IEEE 1588 V2 standard defines Precision Time Protocol (PTP). For general information about IEEE 1588 and PTP, please consult the white paper “wp_IEEE_1588.pdf”, located on the Product Information CD.

This Quick Start guides the user through procedures for setting up a factory-configured XLi IEEE 1588 Clock and standard IEEE 1588 V2 card to function as a PTP grandmaster or PTP slave. For brevity, this guide omits information that may be useful to some users. For more information, please consult the XLi IEEE 1588 Grandmaster Clock (PTPv2) User Guide (XLiIEEE1588(PTPv2)_UG_RevA.pdf), located on the Product Information CD.

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Two Versions

Two versions of the XLi IEEE 1588 Grandmaster Clock (PTPv2) are currently available:

- The first version 1510-712 has:
 - An IEEE 1588 V2 card configured as a PTP master in Option Bay 4
 - A GPS receiver in Option Bay 1
- The second version 1510-713 has:
 - An IEEE 1588 V2 card configured as a PTP master in Option Bay 4
 - An IEEE 1588 V2 card configured as a PTP slave in Option Bay 2
 - A GPS receiver in Option Bay 1

This Quick Start guide is based on the first version. Users with the second version should take care to select the correct Option Bay when configuring the IEEE 1588 V2 cards.

Unpacking

While unpacking, please verify that the following items are included with the XLi IEEE 1588 Clock:

Item	Description	Part Number
1	Yellow Cat 5 Crossover/Patch Cable	161-20007-00-0
2	Gray Cat 5 Network Cable	392-732
3	RG58 Cable with BNC connectors	33 8-001
4	AC Power Cord	161-30100-07-2
5	Null Modem Cable DB9/DB9 F/F	392-756
6	Adapter for RS-232 Port	39 1-004
7	CD, XLi IEEE 1588 V2 Grandmaster User Guide	098-00121-00
8	1 ³ / ₄ inch Rack Mounting Brackets (x2)	206-800
9	Tach-it Loops DBL HDR 5in (x4)	232-007
10	Screw FH SS 8-32X 5/8	241-008-005
11	L1 GPS Antenna Assembly w. RG-59 Cable, Hose Clamps and misc. other hardware	142-614-50

PTP Grandmaster

Apply the following procedures to operate an IEEE 1588 V2 card as a PTP grandmaster.

Setting up GPS as a Reference Source

Symmetricon strongly recommends using the GPS antenna/receiver to synchronize the PTP grandmaster with TAI (Temps Atomique International), the standard time scale for PTP.

1. Select a GPS antenna site outdoors that provides a good view of the sky:

- The ideal site provides an unobstructed 360-degree view of the horizon and sky.
 - A stayed antenna mast on a building rooftop typically provides the best views.
 - The site must be within cabling distance of the XLi IEEE 1588 Clock. The standard coaxial cable supplied with the instrument is 50 ft (15.24 m) long. Consider additional equipment, such as lightening arrestors, when calculating this distance.
2. Temporarily fasten the standard GPS antenna (supplied) in place until you've verified GPS signal strength. (See "Verifying GPS Signal Strength" on page 6.)
 3. Run the antenna cable to the XLi IEEE 1588 Clock. Observe applicable codes and regulations.
 4. Connect the GPS antenna cable to the ANTENNA connector on the GPS receiver card (87-8028-2).

Note: GPS antennas that are not 12-volt capable may be permanently damaged if connected to the XLi IEEE 1588 Clock.

Making Additional Connections

1. Connect the **NET** network port on the XLi main CPU card to the network.
2. Connect the **1588** network port on the 1588 V2 card to the network.

Note: The XLi IEEE 1588 Clock is supplied with one standard and one crossover network cable. The crossover cable can be used for synchronizing a PTP slave directly to a PTP master without using a network device such as a hub or switch in between. Use standard network cables when connecting the NET and 1588 network ports to network devices.

Note: the AC power should be off for at least 3 minutes before repowering the unit.

3. Connect the power supply to AC power. The XLi IEEE 1588 Clock starts.

Manually Setting the Time

If GPS is being used, skip to "Configuring the NET Network Port" on page 4.

If the GPS antenna/receiver is not being used as a timing reference source, manually set the time using function F3.

To set the time using function F3, press the following buttons on the keypad display interface:

Press button or enter:

The display responds:

MENU

Up-arrow, twice.

ENTER

Up-arrow, once.

ENTER

Enter the UTC date.

ENTER

Enter the UTC time.

F3 TIME DATE

TIME MODE – LOCAL

TIME MODE – UTC

DATE-TIME

DATE-TIME

Press button or enter:

ENTER
ENTER

The display responds:

SAVE CHANGES? YES

Upon setting the time with F3, the IEEE 1588 V2 card starts operating as a PTP grandmaster. Otherwise, the IEEE 1588 V2 card waits until the XLi IEEE 1588 Clock is locked to GPS before it starts operating as a PTP grandmaster.

Caution: Setting the time manually and using GPS as the reference source causes a discontinuity when the XLi IEEE 1588 Clock locks to GPS.

Configuring the NET Network Port

To access the command line interface using Telnet and the web interface using a browser, configure the NET network port, located on the rear of the XLi main CPU card.

Using function F100 on the keypad display interface, make the following entries:

Press button or enter:

ENTER 100 ENTER
ENTER

Enter a valid IP address.

ENTER

Enter a valid subnet mask.

ENTER

Enter a valid default gateway.

ENTER, multiple times.

ENTER

The display responds:

COMPANY/UNIT...
IP ADDRESS

SUBNET MASK

DEFAULT GATEWAY

SAVE CHANGES? YES

Saves and applies the changes.

Configuring the IEEE 1588 V2 Card

The IEEE 1588 V2 card located in Option Bay 4 is factory configured as a PTP master with the following settings:

- PTP AVAILABILITY - OPTION BAY 4
- Static IP Address - 010.050.000.103
- Static IP Subnet Mask - 255.255.000.000
- Static IP Default Gateway - 010.050.000.001
- DHCP – ENABLE
- Port – ENABLE

- XLi Reference Clock Configuration - Master
 - Priority 1 - 128
 - Priority 2 - 128
 - Domain Number – 0
-
- Sync Interval /Min (E2E) Delay Req Interval – 1 sec / 1 sec
 - Mean Announce Msg Tx Interval – 2 sec
 - Announce Receipt Timeout Multiple - 3
 - Delay Mechanism – E2E
 - Min Peer Delay Req Tx Interval – 1 sec

Note: The IEEE 1588 V2 card requires 5 minutes from power up to initialize. Until then, the card does not appear in the user interfaces, or is reported as “PLEASE WAIT FOR PTP V2 INITIALIZATION”.

Symmetricon strongly recommends that customers let their IEEE 1588 V2 cards use DHCP¹ to obtain network address settings (IP Address, Subnet Mask, Default Gateway). In the factory default configuration of function F 133, DHCP is enabled.²

If the user configures the IEEE 1588 V2 card with static network address settings, it is very important to observe the following guidelines.

Here is an example of settings that meet this requirement (valid):

- IP Address:192.168.31.125
- Subnet Mask:255.255.255.0
- Default Gateway:192.168.31.1

Here is an example of settings that **do not meet** this requirement (not-valid):

- IP Address:192.168.31.125
- Subnet Mask:255.255.255.0
- Default Gateway:10.24.0.1

Stated another way: In a valid configuration, portions of the IP Address and Default Gateway are the same. For example, for each 225 in the Subnet Mask, the IP Address and Default Gateway match, as shown in **bold** below:

Parameter	Octet 1	Octet 2	Octet 3	Octet 4
IP Address	192	168	31	125
Subnet Mask	255	255	255	0
Default Gateway	192	168	31	1

The Subnet Mask is determined by the structure of the network and may not match the examples above. For more information and assistance on configuring valid static network address settings for your network, consult with your IT Department or Network Administrator.

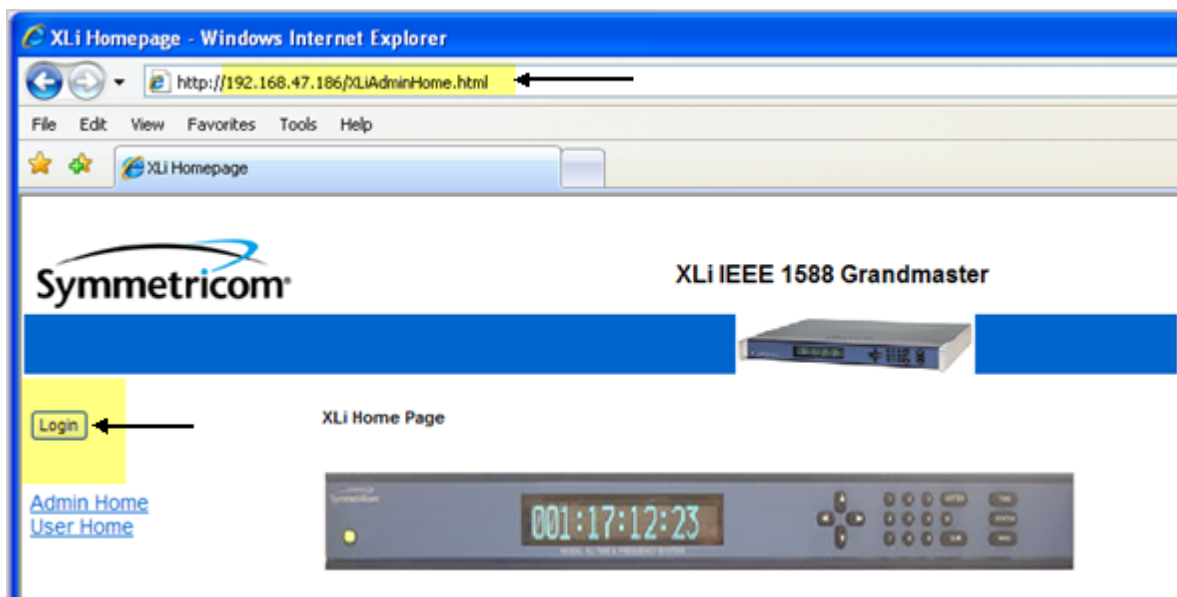
1. Dynamic Host Configuration Protocol server.

2. To query this setting, enter the following at the command line: **F133 B<N> DHCP**. (replacing <N> with the option bay). Or simply use the MENU button to find and select F133 on the front panel keypad/display.

Note: The factory configuration has PTP DHCP for the 1588 port enabled. If a DHCP server is present on the network connected to the 1588 port, the user does not need to configure the static IP address, subnet mask, and default gateway. The DHCP-assigned settings will supersede the static ones. If a DHCP server is not present, disable PTP DHCP and configure the static IP address, subnet mask, and default gateway.

Logging into the Web Interface

1. Using a web browser, **enter the IP address of the NET port** as the URL.
2. At the XLi Home Page, click the **Login** button.



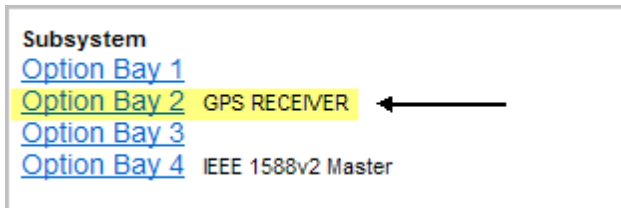
3. At the Login Page, enter user name, "**operator1**", and the password, "**zeus**".

Note: Avoid logging onto web interface and the command line through the serial port at the same time.

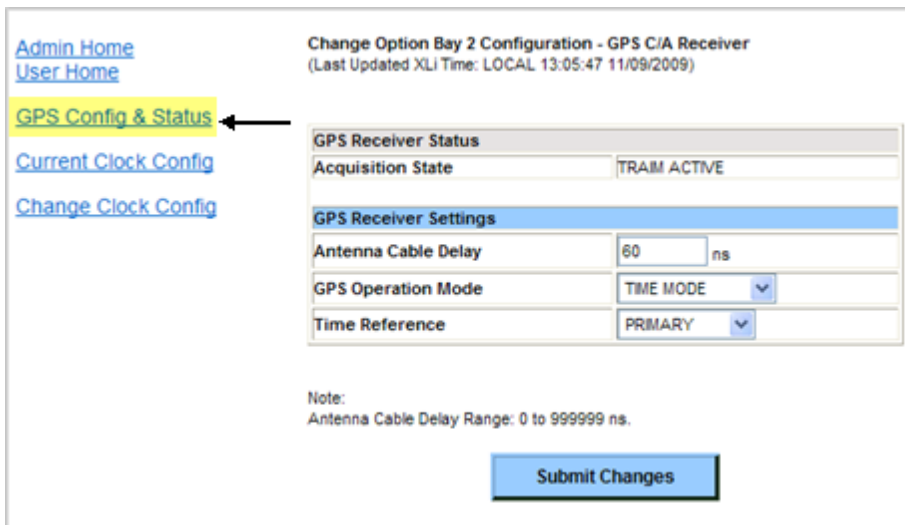
Verifying GPS Signal Strength

When using the UPS, Press **STATUS** on the keypad display. If the display shows "**LOCKED GPS PRI**":

- The XLi IEEE 1588 Clock is locked to GPS as the reference source.
 - The IEEE 1588 V2 card is operating as PTP master.
 - Completing the steps in this section is optional.
 - The GPS antenna site is good. The user can permanently secure the GPS antenna.
1. Having logged in to the web interface, click the link for the **GPS Receiver** on the Admin Home page.



2. Verify the settings shown below, especially Time Reference = Primary.



3. Click the link for **GPS Config & Status** (as shown above).
4. On the next page, if GPS Status = Locked, the site for the GPS antenna is good and the IEEE port is operating as a PTP grandmaster. You can permanently fasten the GPS antenna.

Otherwise, if GPS Status = Unlocked, check that GPS Antenna Status = OK. Allow approximately 20 minutes from startup to elapse before checking GPS Status again or trying a new site for the GPS antenna.

[Admin Home](#)
[User Home](#)
[GPS Satellite List](#) ←
[Change GPS Settings](#)

Option Bay 2 Configuration & Status - GPS C/A Receiver
(Last Updated XLI Time: LOCAL 11:25:39 11/09/2009)

GPS Receiver Status	
GPS Status	LOCKED
GPS Antenna Status	OK
Acquisition State	TRAM ACTIVE

GPS Board Configuration	
Part Number	87-8028-02
Software Version	230-01510-04v1.20
FPGA Version	184-8024v1

GPS Position - LLA	
Latitude	N 38d30'37.0"
Longitude	W 122d47'43.1"
Altitude	14m

GPS Position - XYZ	
X Position	-2706771m
Y Position	-4200844m
Z Position	3949932m

Admin Configurable Settings	
Antenna Cable Delay	60 ns
Time Reference	PRIMARY

5. (Optional) While waiting for GPS Status = Locked, click the link for **GPS Satellite List** (as shown above). The Tracked Satellite List must show at least four “Current” satellites for the GPS receiver to initially lock. A low number (<4) of GPS satellites indicates a potential problem with GPS signal strength or visibility at the current site.

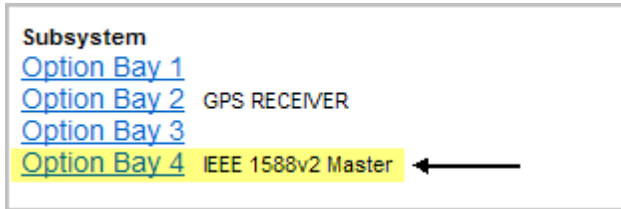
Tracked Satellite List			
PRN	Status	Utilization	Level (dBW)
2	Good	Current	-154dBW
4	Good	Current	-154dBW
9	Good	Current	-154dBW
12	Good	Current	-152dBW
17	Good	Current	-155dBW
26	Good	Not Used	-162dBW
27	Good	Current	-153dBW
30	Good	Current	-156dBW
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Note: If needed, contact Symmetricom Customer Assistance. See page 9.

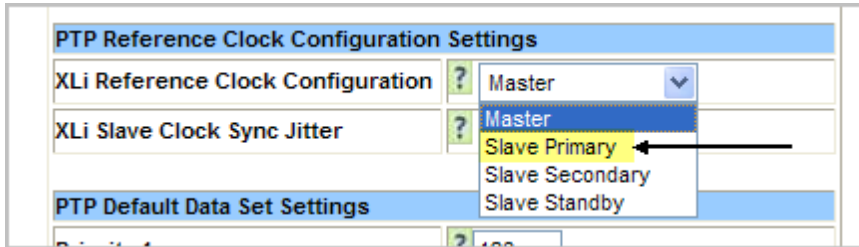
PTP Slave

To reconfigure the IEEE 1588 V2 card in Option Bay 4 to a PTP slave, complete the following steps:

1. Having logged in to the web interface, from the Admin Homepage, click the link **Option Bay 4 IEEE 1588 V2 Master**. The new 1588 V2 web page takes approximately 5 seconds to load.



2. Set Clock Configuration to **Slave Primary**.



3. Try operating with XLi Slave Clock Sync Jitter at the low selection. Timing networks with bursty or heavy traffic, routers, or many layers of hubs and switches may need the high selection. For more information on jitter settings, see section "6.1.2.2 XLi Slave Clock Sync Jitter" on page 199 of the XLi IEEE 1588 V2 Grandmaster Clock User Guide.
4. Click the **Submit Changes** button.
5. The front panel display should show "**LOCKED PTP PRI**" soon after.

The IEEE 1588 V2 card is now operating as a PTP slave and as the primary reference source to the PTP master. The GPS receiver, which was previously operating as the primary reference source to the IEEE 1588 clock, is now a standby reference source.

Note: When reconfiguring the IEEE 1588 V2 card as a PTP master later on, reconfigure the GPS receiver as the primary reference source (In F119, set GPS TIME REFERENCE, BAY 1 back to PRIMARY).

Note: For the optional IEEE 1588 V2 card in **Option Bay 2**, already configured as a PTP slave, configure the network settings. The factory settings are the same as for the PTP master, except the static IP Address is 010.050.000.105 and Clock Configuration is Slave Standby.

Symmetricon Customer Assistance

Symmetricon's Customer Assistance Centers are a centralized resource to handle your customer needs.

Telephone Support

- Worldwide (Main Number): 1-408-428-7907
- USA, Canada, Latin America including Caribbean, Pacific Rim including Asia, Australia and New Zealand: 1-408-428-7907
- USA toll-free: 1-888-367-7966 (1-888-FOR-SYMM) Europe, Middle East & Africa: 49 700 32886435

Technical Support can be obtained by calling one of the Customer Assistance Center numbers above, or from the Online Support area at www.symmetricom.com.

When calling the Worldwide or USA telephone number:

- Select Option 1 at the first prompt.
- Select Option 2 for Timing, Test and Measurement Division products.

Technical Support personnel are available by phone 24 hours a day, 7 days a week through the Main Customer Assistance Center number above and from 8 AM to 5 PM Central European Time, week-days, at the Europe, Middle East and Africa number.

Email Support

Customers who have purchased Technical Support Contracts can e-mail support requests to:

support@symmetricom.com (Americas, Asia, Pacific Rim) emeasupport@symmetricom.com
(Europe, Middle East, Africa)