



IoT Gateway Manual

YieldPoint Inc.

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YieldPoint hardware and software products are not designed to be used in the diagnosis and treatment of humans.

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Introduction

About This Manual

This manual is for YieldPoint's IoT Gateway Products. These gateways connect to a YieldPoint d4Logger data logger via a TTL serial cable and regularly downloads instrument readings to its internal database. These instrument readings are accessible through the gateways web interface in a variety of formats and can also be exported to external servers and data platforms.

Revision Status

Date	Revision	Description
July 2016	1.0	Getting Started
October 2016	1.1	Updated Getting Started
February 2017	2.0	Manual Rewrite for YPGateway1611XX+ Version
February 2018	3.0	Manual updated for 1802XX gateways with new web interface and GDP upload functionality.

Gateway Revisions

Free software updates are available for all gateways. Please contact YieldPoint to ensure you have the latest version of gateway software for best reliability and ease of use.

Date	Revision	Description
March 2016	YPGateway1603XX	Initial Release
April 2016	YPGateway1604XX	Updated web interface
June 2016	YPGateway1606XX	YPGateway1604XX Clone
November 2016	YPGateway1611XX	Updated web interface, push mode removed
February 2017	YPGateway1702XX	Web interface revised
August 2017	YPGateway1808XX	Replaced MySQL Database functionality with GDP Server
February 2017	YPGateway1802XX	New gateway types, implementation of OTA updates and improved web interface

Product Specifications

The gateway uses a BeagleBone Black micro-computer with a proprietary YieldPoint daughterboard containing the required gateway systems. It is a singleboard computer running Debian 9 Linux and optimized for IoT applications. The products

- AM3358 1GHz ARM® Cortex-A8 Processor
- 4GB 8-bit eMMC Onboard Flash
- 100 Mb Ethernet
- Dedicated hardware power and reset buttons

Types of Gateways

YieldPoint offers four types of gateway products for different project requirements and circumstances.

Gateway	Description
dXGateway	dXGateways are YieldPoint's flagship gateway for wired instrumentation monitoring. A dXGateway can be ordered with 4, 8, 12 or 16 ports for instrumentation. A 4 port dXGateway would be called a d4Gateway.
1 For 1 Gateway	1 For 1 Gateways and Radio Nodes are built around the concept of 1 radio per instrument. By giving each instrument its own mesh radio, the mesh becomes significantly more resilient and distributed. This system is completely built around the concept of simplicity and long battery life.
Logger Gateway	The Logger Gateway internet enables a d4Logger using a cable attached to the loggers serial port. This system works great for environments where there can be frequent power outages and the d4Loggers internal batteries can keep taking instrument readings at regular intervals.
dMesh Gateway	The dMesh Gateway and dMesh nodes enable d4Loggers to be wirelessly send instrumentation data to the gateway. This is a great system for clients who already have deployed d4Loggers are now looking to wirelessly automate the data collection process.

Equipment to get started

To setup and operate a gateway, the following items are required:

- A Gateway
- 12V DC 1.0A power supply or IEEE 802.3af PoE Injector for PoE enabled Gateways
- Ethernet Cable
- Microsoft Windows 7, 8.1 or 10 computer with an Ethernet port

An Ethernet network running a DHCP server is helpful to use as by default, all gateways ship set to DHCP. This allows for quick plug and play performance. When using a computer directly plugged into a gateway, a crossover Ethernet cable is recommended but almost all modern computers have Auto-MDIX don't require one.

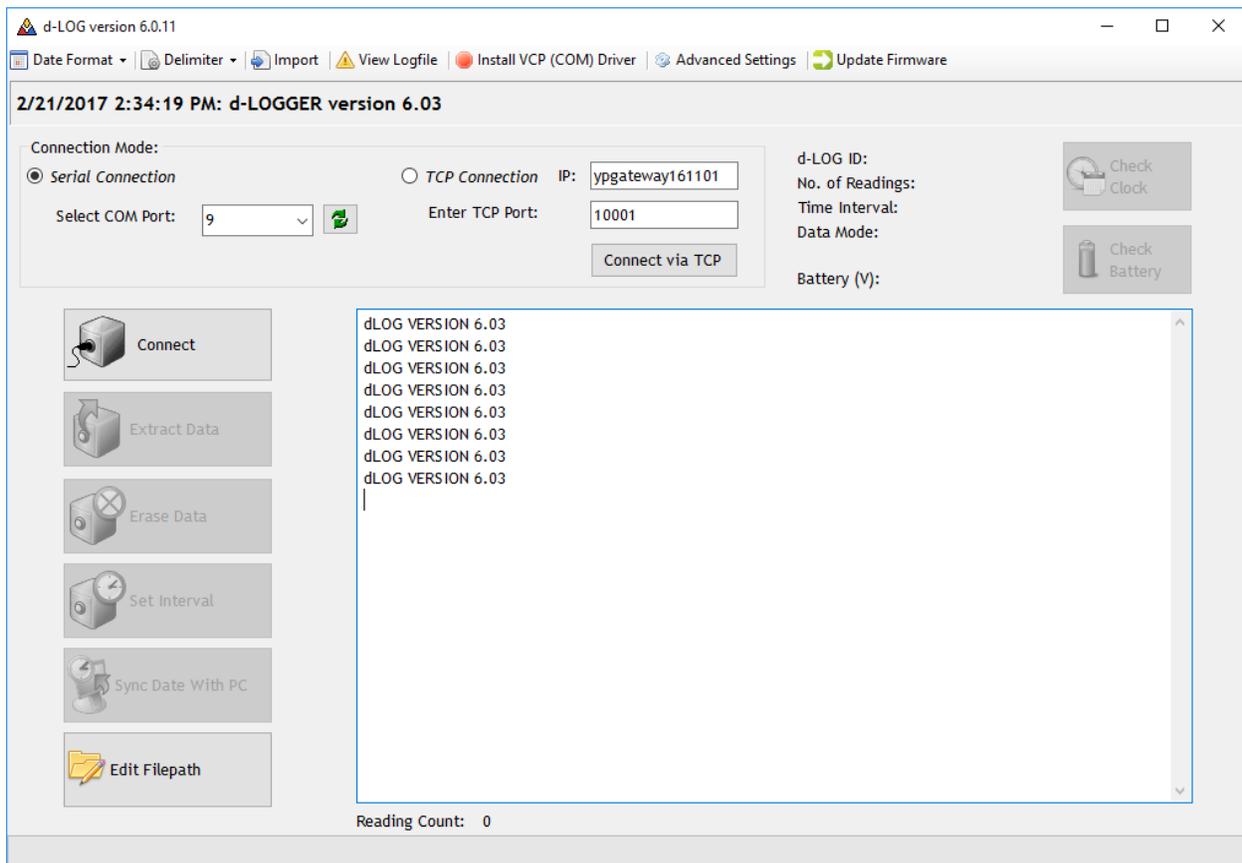
To monitor YieldPoint Instruments with the gateway, the following items are required:

- YieldPoint instruments with 5 pin plugs. Instruments do not need to be installed to provide measurements.
- A d4Logger, d4Logger and dMesh node or 1 For 1 Radio node if your gateway requires them
- Power for the gateway where it will be installed
- Connection to existing Ethernet infrastructure where the gateway will be installed
- Waterproof Ethernet plug for wet environments

Requirements for Gateways that use d4Loggers

It is imperative that 1510-XX serial number or later YieldPoint d4Loggers are used with the wired gateway for best results. D4Loggers before October 2015 do not have diode protection for their batteries and can only be used with a wired gateway or power supply without batteries. Loggers before 1506-XX cannot be used with wired gateway because their firmware can't be updated to the latest version.

D4Loggers must be running firmware version 6.50 or later to be compatible with a logger gateway. To check if your d4Logger is running logger firmware 6.50 or later, please open YieldPoint dLog and plug in the d4Logger using a USB download cable. Even without batteries, your logger should output it's version number.



Please contact YieldPoint if you have any questions regarding your logger serial number or firmware version number. If your logger serial number sticker has come off your logger, you can use YieldPoint dLog to check it's serial number. D cell batteries will be required for doing anything beyond checking the d4Loggers firmware version number.

Software

Required Programs for Gateways

- Google Chrome Web Browser
- YieldPoint dLog version 6.0.13 or later for Gateways that use d4Loggers
- YieldPoint dMesh version 4.1.1 or later for Gateways that use radios

YieldPoint software can be found on our website, www.yieldpoint.com under Recourses, Software Downloads or at <http://yieldpoint.com/resources/software-downloads.php>.

The program Angry IP Scanner can be useful for finding gateways IP addresses and hostnames on your network. <http://angryip.org/download/#windows>

For remote YieldPoint diagnostics or software updates, please download: PuTTY and CyberDuck. PuTTY is a Secure Shell(SSH) client and CyberDuck is a SSH File Transfer Protocol(SFTP) client. Downloads for PuTTY and CyberDuck can be found <https://www.putty.org/> and <https://cyberduck.io/>

Gateway Setup, Network Configuration and Rescue Mode

First boot

Plug in your Ethernet cable and then the 12V DC power plug into the gateway. Make sure the Ethernet cable is plugged into your DHCP Ethernet network. The gateway will turn on automatically when plugged into power. To turn the gateway off, the blue LED should be pushed and the gateway given time to shutdown fully. The gateway will be ready to be unplugged after all the LEDs have turned off. The gateway by default is set to DHCP but can be changed to a Static IP if desired. The gateway takes about 45 seconds to a minute to fully boot up. The blue POWER button will turn on when the gateway is powered up. After 30 seconds or so the RESET button will pulse a heartbeat when the gateway is functioning normally. When the RESET and RESCUE button start flashing, the device can be browsed to via the web interface, pinged and SSHed into. The RESCUE button will flash for 30 seconds before turning off. If the gateway is in autonomous mode, the RESCUE LED will turn on when the gateway is performing a logger download and off once it has completed the download.

Navigating to your Gateway

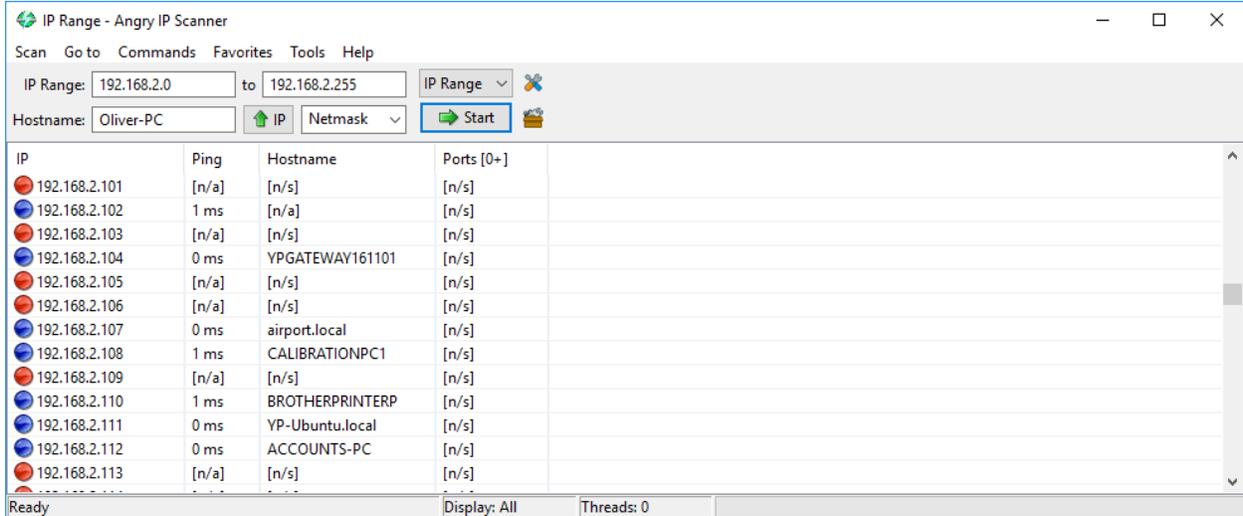
The gateway has been developed and tested using Google's Chrome Web Browser. Other web browsers will probably work but are not supported. If your network supports hostnames type `http://` and the gateways name `YPGateway161101` into your web browser.



If your network does not support the use of hostnames or your gateway has been set to a static IP. Type in it's IP address

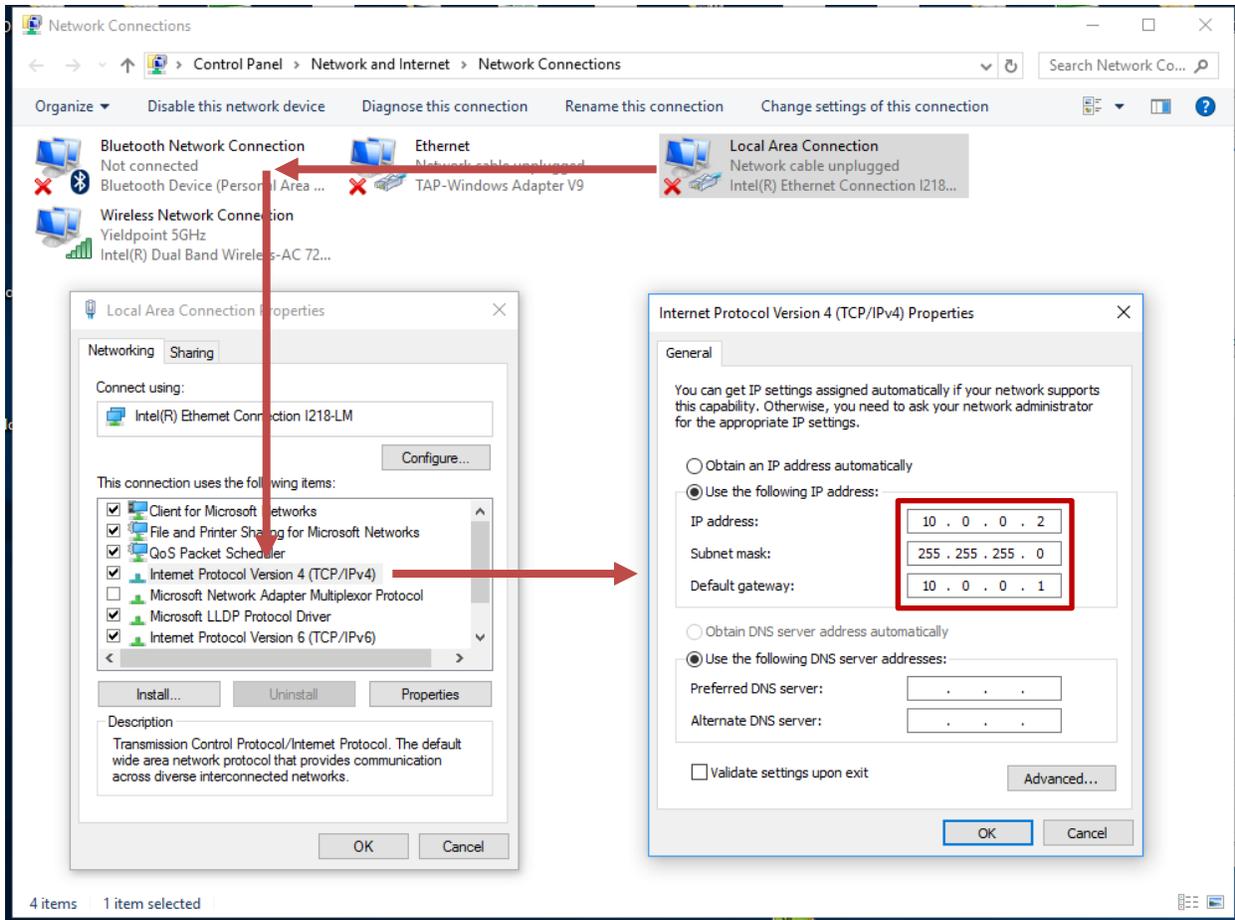


If you have trouble navigating to your gateway or finding the IP address the router assigned it, either log into the router to check the list devices connected to your network or use the program Angry IP Scanner to scan your network. Your IT department should be able to help with this but feel free to give YieldPoint a call if you have any questions.

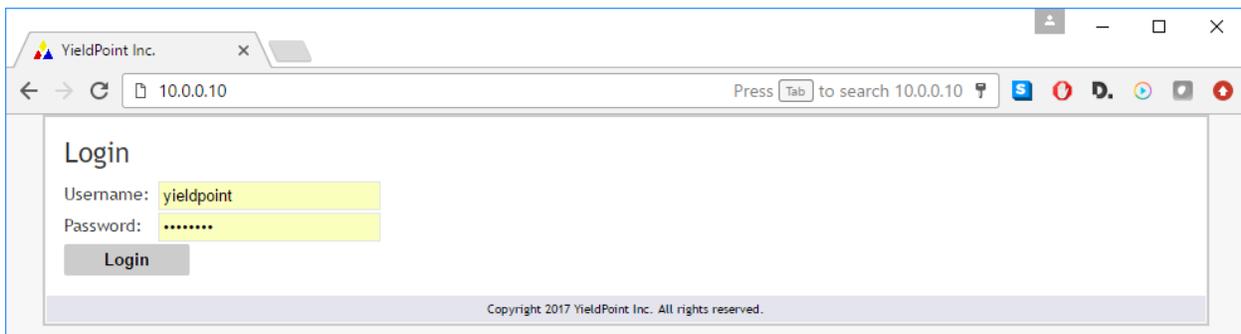


Rescue Mode

The gateway can be put in *Rescue Mode* to allow for configuration directly with a PC. This is useful if a DHCP network is not available or if the static IP has been set incorrectly or forgotten. In *Rescue Mode* the Gateway will self assign a static IP of 10.0.0.10. This can be browsed to by typing 10.0.0.10 into Google Chrome. To enter *Rescue Mode*, power down the gateway by pressing the Blue LED power button. Wait for all the LEDs on the gateway to turn off before unplugging anything. Plug the gateway into your PC's Ethernet port using an Ethernet cable. Set your Ethernet port's IP Address to 10.0.0.2, Subnet Mask to 255.255.255.0 and Default Gateway to 10.0.0.1.



Once your PC's Ethernet port is set, power up the gateway by either plugging in power or by pressing the POWER button. When the white RESCUE LED starts flashing, press and hold the button until it stops flashing. Once the RESCUE LED stops flashing, navigate using Google Chrome to *10.0.0.10*.



Web Interface and Data Access

Logging Into The Web Interface

The gateway is designed to be configured via its web interface like a household wireless router. All functions and settings are available from the web interface. The default login on the gateway is as follows:

Username: *yieldpoint*

Password: *YPfuture*

The username and password are both case sensitive. In all versions of the gateway, there is no way for the end user to change this default username or password. Please contact YieldPoint if you want to add users or change the default username and password and we can assist you with this. This is done to ensure that clients are not locked out of their gateways.

Once logged in you will be greeted by the homepage.



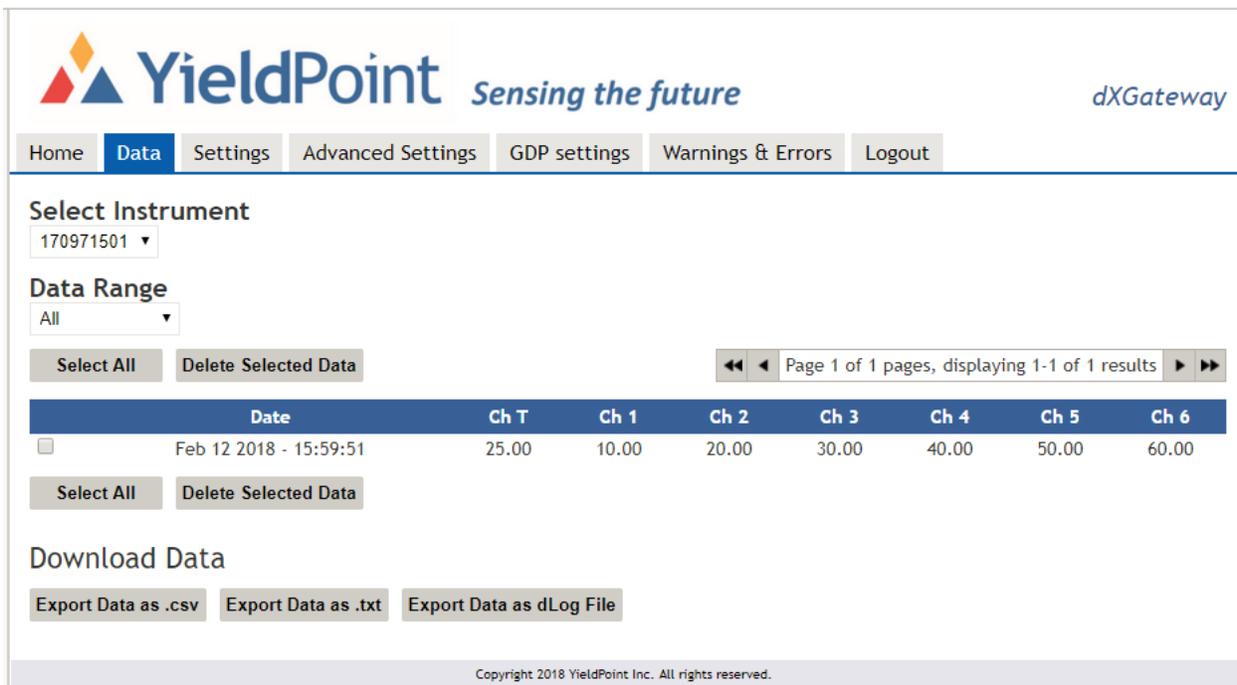
The screenshot shows the YieldPoint web interface homepage. At the top left is the YieldPoint logo with the tagline "Sensing the future". To the right of the logo is the text "dXGateway". Below the logo is a navigation menu with buttons for "Home", "Data", "Settings", "Advanced Settings", "GDP settings", "Warnings & Errors", and "Logout". The main content area displays system information: Hostname: YPGateway180200, IP Address: 10.0.0.101, Current Time: Feb 16, 2018 17:40:36, Free Disk Space: 1123.92 MB, Software version: 06.3, and Uptime: 1 day, 3:38. Below this information, it states "Gateway is in Automatic Mode" and "Gateway is currently downloading from loggers". At the bottom of the page, there is a copyright notice: "Copyright 2018 YieldPoint Inc. All rights reserved."

This homepage gives a snapshot of the gateway and its current settings. This gateway is a *dXGateway*, has a hostname of *YPGateway180200*, IP address of *10.0.0.101*, current date and time of *Feb 16, 2018 17:40:36* and free disk space of *1123.92 MB*. The version of software currently running on the gateway *06.3* and it has been powered on for *1 day, 3 hours and 38 minutes*. It is also in *Automatic Mode* for data collection and is in *standby* meaning it currently isn't downloading from instruments

YieldPoint instrument readings are take up minimal disk space and under normal circumstances, will not ever fill up a gateway. From testing, 15,000 readings take up 1 MB, this means that this gateway could store up to 12,675,000 readings or 361 years of 4 instruments sampled every hour. From a design point of view, the gateway is intended to transfer readings to the YieldPoint Geotechnical Data Platform(GDP) server and not be used as a long term data storage platform. Gateways are often located in very harsh conditions with limited physical access and it is important that data is regularly downloaded or pushed to the GDP to prevent data loss.

Accessing Instrumentation Data

Navigate to the *Data* tab on the web interface to view data downloaded by the gateway. All instrumentation readings on the gateway can be viewed here. This database only gets populated with readings when the gateway is in *Automatic Mode*. An instrument can be selected using the dropdown sensor box. If the gateway is brand new or has recently had its instrument data deleted, it will not have any readings to display. To speed up page loading times, only one hundred readings are shown at a time. To navigate through the readings use the page arrows on the right. The *Data Range* can also be set to the *past 24 hours, 3 days, 7 days, 31 days, All or Custom* data range. Instrument data can be selected and deleted using the check boxes and *Select All* and *Delete Selected Data* buttons. This is useful if an outlier readings needs to be deleted from the gateways internal database. The *Select All* button only selects the one hundred readings on the page. To delete all the instrument readings from the internal database, use the *Delete All Instrument Data* button in the *Advanced Settings* tab.



YieldPoint Sensing the future dXGateway

Home **Data** Settings Advanced Settings GDP settings Warnings & Errors Logout

Select Instrument
170971501 ▼

Data Range
All ▼

Select All Delete Selected Data

Page 1 of 1 pages, displaying 1-1 of 1 results

	Date	Ch T	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6
<input type="checkbox"/>	Feb 12 2018 - 15:59:51	25.00	10.00	20.00	30.00	40.00	50.00	60.00

Select All Delete Selected Data

Download Data

Export Data as .csv Export Data as .txt Export Data as dLog File

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At the bottom of the data page, the gateway offers the option to download the instruments data in a variety of formats. The data can be exported as a comma separated values(.csv) file, text(.txt) file or as the legacy YieldPoint dLog format text file for use in YieldPoint MineScope. The export buttons export all instrument readings for the selected *Data Range* and not just the one hundred readings displayed. Multiple instruments data sets must be downloaded one by one from the gateway.

Gateway Settings Tab

All commonly used gateway settings are accessible on the *Settings* tab. This is the main tab for controlling the gateways *Data Access* mode and *Instrument Sampling Interval* period. Whenever changes are made to any of the items on the web interface, they need to be saved using the *Save* button.

The screenshot displays the YieldPoint dXGateway settings interface. At the top, the YieldPoint logo and tagline "Sensing the future" are on the left, and "dXGateway" is on the right. A navigation bar contains buttons for "Home", "Data", "Settings" (which is highlighted), "Advanced Settings", "GDP settings", "Warnings & Errors", and "Logout".

The main content area is titled "Data Access". Under "Automatic Mode:", the "Automatic Mode" radio button is selected. Below it, a description states: "The gateway will automatically download readings from the data loggers at a set [interval](#)". Under "Manual Mode (port 10001):", the "Manual Mode" radio button is unselected, with a description: "Manually download readings and interact with the system using YieldPoint's d-LOG or d-MESH software". A "Save" button is located below the manual mode section.

The next section is "Instrument Sampling Interval", with the subtext "How often instrument readings are taken." Below this is a dropdown menu currently set to "1 min". A "Save" button is located below the dropdown.

At the bottom of the page, a copyright notice reads: "Copyright 2018 YieldPoint Inc. All rights reserved."

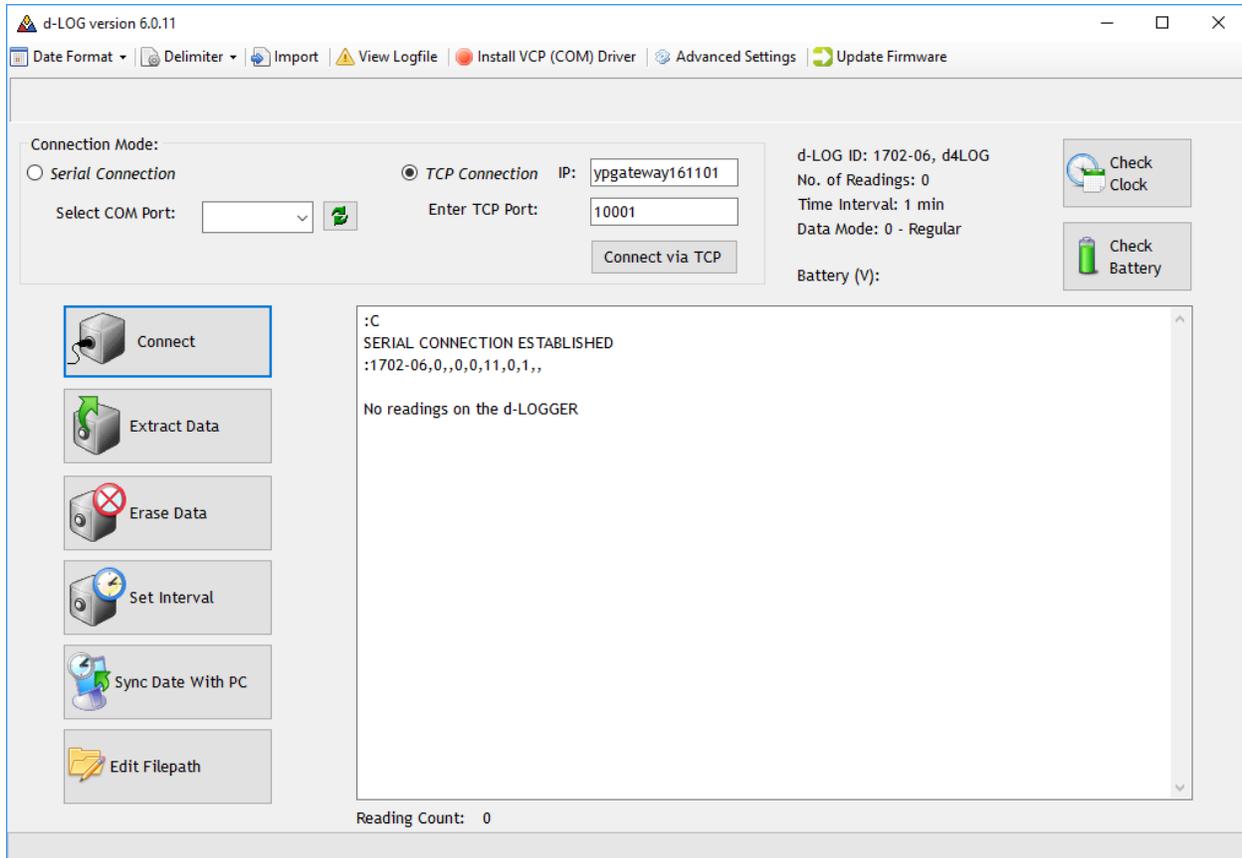
Automatic Mode

In automatic mode the gateway downloads the instrument readings, saves the readings to its internal database and uploads the readings to an external database if enabled. Clicking the [interval](#) link will take you to *Instrument Sampling Interval* dropdown box. The *Instrument Sampling Interval* is the rate the gateway takes instrument readings. This rate can be set anywhere from 1 minute to 24 hours. For most projects a sampling rate of *1 hour* is more than enough to measure long term changes over time. It is strongly recommended that radio gateways do not sample instrument readings faster than *1 hour* as battery life will be reduced. In preliminary testing, a d4Logger sampling at 1 hour intervals will last six months on 4 D cell batteries and a standard 1 For 1 Radio Node will last two years.

Manual Mode

Manual Mode on the gateway is for interacting with the dXGateway, d4Logger or radio module through YieldPoints dLog or dMesh programs. This can be useful for manually downloading instrument readings, erasing instrument readings and synchronizing your PCs date with the data logger. Manual mode should only need to be used troubleshooting or updating the d4Loggers internal clock after daylight savings time changes.

The gateway connects to dLog and dMesh by using a TCP connection instead of a USB serial connection. The default TCP port is 10001 but can be changed by clicking the blue port number. The manual mode TCP port can be set to any port number except 22, 80, 3306, 5000 and 8000.



Advanced Settings Tab

The *Advanced Settings* tab contains all other settings for the gateway. These settings include, *Port Settings*, *Gateway IP Address Settings*, *Timezone Settings*, *NTP Time Server Settings*, *Update Server Settings* and buttons to delete instrument data.

For the gateway to store its time stamped instrument readings as accurately as possible, it is important that the gateway knows where it is in the world. The time zone can be set using the dropdown *Timezone Settings* box. Once the timezone has been set, it is important that the time on the gateway is also correct. This can be set using a NTP server either on your local network or online.

YieldPoint offers over the air updates from our server, *gdp.yieldpoint.com*, port 5000. Please leave the server address and port to its default settings unless your site has its own dedicated update server.

Instrument data can be deleted off the gateway to free up storage space. It can be deleted using the *Delete All Instrument Data* and *Delete All Data* buttons. To reset the gateway to factory defaults the *Factory Reset* button can be used. Warning, the *Factory Reset* button will reset the gateway to DHCP.

Port Settings

Please select a free port (Do not select ports 22, 80 or 3306)

Passthrough Mode Port:

Save

Gateway IP Address Settings

Please consult your IT department before changing the gateway's IP Address.

Warning! Changing the gateways IP Address can cause it to become unreachable and will require it being retrieved and reset using rescue mode.

DHCP

Static IP

IP Address:

Network Mask:

Gateway IP:

DNS:

Save

Timezone Settings

America/Toronto

Save

NTP IP Address

Save

Updates server

Server Address:

Docker Port:

Save

Reset Logger/Radio

Reset

Delete All Instrument Data

Removes the instruments from database

Delete

Delete All Data

Deletes all data including instruments, instruments data, alarms, log data, and radios. Also clears radio and logs databases.

Delete

Factory Reset

Restores gateway to factory settings. Deletes all data and replace the current settings folder. (Gateway will be set to DHCP)

Reset

Reboot

Reboot the device. This may take some time, hit the 'reboot' button and refresh the page after couple of minutes.

Reboot

GDP Settings

YieldPoint Geotechnical Data Platform database uploads can be configured through the *GDP Settings* tab. GDP uploads are turned on using the *Upload data to GDP* checkbox and pressing save. The Gateway will always record instrument readings to its internal database when running in Automatic Mode. *GDP Mode* is for the export of instrument readings to an external GDP server. The GDP credentials must be entered correctly for data to be successfully pushed to the GDP. *Instrument/Gateway Tags* is used for attaching metadata to GDP uploads. This is helpful if a gateway is part of a project or installed in a specific location as all uploaded instruments will automatically be tagged with that information.

 dXGateway

Home Data Settings Advanced Settings GDP settings Warnings & Errors Logout

Geotechnical Data Platform (GDP) settings

Upload data to GDP

GDP host:

GDP user:

GDP password:

Save

Instrument/Gateway Tags

These tags will be attached to every instrument the gateway loads into the YieldPoint Geotechnical Data Platform.

Project:

Location:

Level:

Borehole:

Install Date:

Installed By:

Purpose:

Notes:

Save

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