

NETDUO WiFi Adapter User Guide



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Disclaimer and Revisions

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Attention: This product has been designed to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause harmful interference to radio communications.

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Date	Rev.	Author	Comments
06-30-2020	A	EDL	Preliminary Release
01-22-2021	B	EDL	Updates for production release

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1. Overview

1.1 Introduction

The NETDUO is a network bridge device with wired and wireless Ethernet plus a single serial port for RS232 / RS485 communication. The NETDUO contains an xPico 200 series module with Grid Connect's uniquely optimized firmware build. The module features a Wifi interface with Soft AP for easy wireless configuration, powerful bridging features and a wealth of security features to maintain data privacy and protect against unauthorized access.

Here are some of the NETDUO's possible applications:

- Ethernet to Wifi bridge
- Serial device server over its own Soft-AP Wifi, the local network or internet
- Modem emulation
- Modbus/TCP server to Modbus serial bridge
- Web page front-end to legacy serial devices via its Monitor feature or web API
- SMTP email client via its serial Command Line Interface (CLI)
- Or some combination of all of these using its multiplexer serial interface protocol

A Web Manager provides a browser-based configuration and diagnostic tool. Configuration and device status can also be accessed via the Command Line Interface (CLI) through the serial line or a network port. The unit's configuration is stored in nonvolatile memory and is retained without power.

1.2 Hardware Description

The NETDUO kit contains the following items:

- NETDUO bridge module with dual-band Antenna(s)
- +9VDC Power Supply (or similar power supply)*

*not included with terminal block power model

1.3 Additional Documentation

The following guides are available for download on the internet.

Title	Description and Location
NETDUO User Guide	This document providing Quick Start instructions and describing the NETDUO hardware setup. www.gridconnect.com
xPico 200 Series User Guide	Documentation for the Lantronix xPico 200 series communication module used in the NETDUO. This document explains the software features available in the NETDUO. www.lantronix.com https://www.lantronix.com/products/xpico-240/

2. Quick Start

Follow these instructions to get your unit up and running fast.

You must first establish a network connection to the unit. This can initially be done using the wired Ethernet port or using the Wifi interface. The configuration is done via an Internet browser. Once the network connection is established, the browser can be used to login to the unit directly and perform configuration

2.1 Ethernet Setup

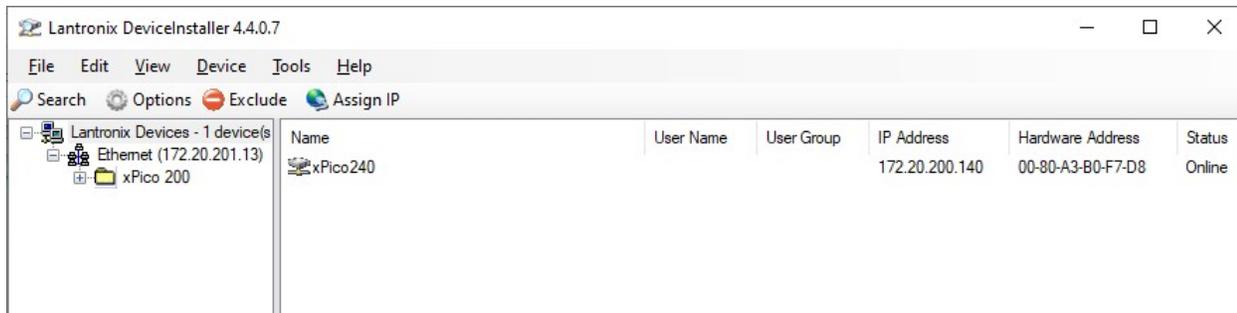
The configuration is done via an Internet browser. Once the NETDUO has established a connection via its own unique SSID, the browser can be used to login to the unit directly and perform configuration.

The following sections will detail the steps for basic setup of the NETDUO over Ethernet.

1. Connect an Ethernet cable for your network to the RJ45 port.
2. Connect power to the NETDUO unit.

2.1.1 Finding the device on the network

1. Run the DeviceInstaller software on a Windows PC to find the NETDUO on the network and determine its IP address which was assigned by your network's DHCP server. If you have not yet installed the DeviceInstaller software you can do so at <http://www.lantronix.com/downloads>.
2. Upon launch, DeviceInstaller will search for xPico 200 Series devices on the network. Select the NETDUO unit from the list of devices on the local network. (You may also click on the Search icon if your device isn't found immediately.)
3. Note the device IP address.
4. Access Web Manager by entering the device IP address in the address bar of a browser. Proceed to section 2.3 below (Web Manager Setup).



2.2 Wifi Setup

The following sections will detail the steps for basic setup of the NETDUO unit over Wifi.

2.2.1 Finding the wireless SSID

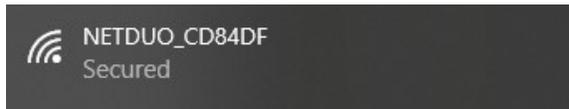
Connect power to the NETDUO unit.

By default the Soft AP mode is enabled with a SSID of NETDUO_XXXXXX, where XXXXXX are the last six characters of the unique xPico 200 serial number. This number is shown on the serial number label attached to the back of the case. For example, if the serial number on the label were 00-80-A3-B0-F7-D8, then the SSID would be NETDUO_B0F7D8.

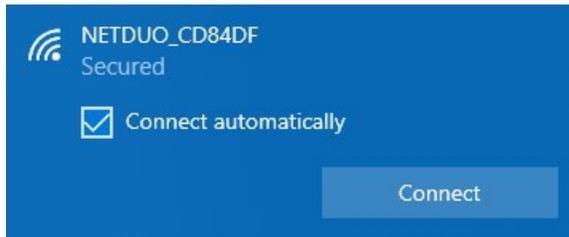
When power is applied to the NETDUO unit, the wireless xPico module will broadcast its own unique SSID. Before any communication with it, a WIFI connection must be established. Use a Wifi enabled device to scan for available wireless networks.

Note: The following images were captured in Windows 10

Click on the wireless network connection status icon in the tool tray.



Click on the NETDUO SSID link to display the connect screen.



2.2.2 Making the WIFI Connection

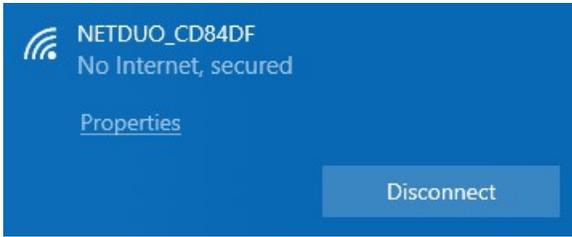
The default security for the NETDUO Soft AP is WPA2 and the passphrase is PASSWORD.

Click the 'Connect' button to establish the connection. Once you click on the button, you will be prompted to enter the security key. The factory default key value is the same for all NETDUO devices and can be changed via the configuration interface.

Enter **PASSWORD** and click the Next button.



When the connection is made, the xPico240 Soft AP network will show as connected.



2.2.3 Entering the NETDUO configuration mode

Open a web browser and navigate to either NETDUO.gridconnect.com or 192.168.0.1.

<http://NETDUO.gridconnect.com/>

2.3 Web Manager Setup

After navigating the browser to the NETDUO you should have the following prompt:

Enter the User Name = **admin** and the Password = **PASSWORD** to access the Configuration and Management web pages. (Both are case sensitive).

A screenshot of a 'Sign in' dialog box. The title is 'Sign in'. Below the title, it shows the URL 'http://netduo.gridconnect.com' and a warning: 'Your connection to this site is not private'. There are two input fields: 'Username' and 'Password'. At the bottom right, there are two buttons: 'Sign in' (blue) and 'Cancel' (white).

Upon entering the correct user name and password, you will see the top-level status menu. Note that the Interface wlan0 shows it is disconnected.

NETDUO
gridconnect.

QuickConnect

Status 🏠

AES Credentials

Bridge

CLI Server

Clock

Device

Diagnostics

Discovery

File System

HTTP Server

Line

Modbus

Modem Emulation

Monitor

NETDUO

Network

NTP

Radio

SNMP

TLS Credentials

Tunnel

User

WLAN Profiles

Product Information		
Product Type:	xPico240	
Firmware Version:	4.6.0.0R7.1	
Serial Number:	0080A3CD84DF	
Uptime:	28 minutes 20 seconds	
Permanent Config:	Saved	
Network Settings		
Interface ap0		
MAC Address:	02:80:A3:CD:84:E0	
State:	Up	
SSID:	NETDUO_CD84DF	
Security Suite:	WPA2	
IP Address:	192.168.0.1/24	
Interface eth0		
MAC Address:	00:80:A3:CD:84:DF	
State:	Up	
Hostname:		
IP Address:	172.20.200.4/16	
Default Gateway:	172.20.206.252	
Domain:		
Primary DNS:	172.20.206.2	
Secondary DNS:	172.20.206.1	
IPv6 State:	Up	
IPv6 Link Local Address:	fe80::280:a3ff:fe0d:84df	
IPv6 Global Address:	<None>	
IPv6 Default Gateway:	<None>	
Interface wlan0		
MAC Address:	00:80:A3:CD:84:E0	
Connection State:	Disconnected	
Line Settings		
Line 1:	RS232, 9600, None, 8, 1, None Protocol: Tunnel	
Line Virtual_1:	Protocol: Command Line	
Line Virtual_2:	Protocol: None	
Tunneling		
	Accept Mode	Connect Mode
Tunnel 1:	Waiting	Disabled
Tunnel Virtual_1:	Inhibited	Inhibited
Tunnel Virtual_2:	Inhibited	Inhibited

admin

[Logout]

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2.4 Configuration Steps for Wifi Connection (wlan0)

To communicate with the NETDUO on your local Wifi network you will need to configure the wireless network interface (wlan0).

Select and click on the **QuickConnect** menu option (left side).

This page shows a scan of the wireless devices within range of the device. The available networks sorted by RSSI are shown. It reports: Network name (Service Set Identifier), Basic Service Set Identifier, Channel number, Received Signal Strength Indication and Security Suite.

Click on the selected network name. In the following examples, “gridconnect” has been selected.

QuickConnect

Status

AES Credentials

Bridge

CLI Server

Clock

Device

Diagnostics

Discovery

File System

HTTP Server

Line

Modbus

Modem Emulation

Monitor

NetDuo

Network

NTP

Radio

WLAN Link Scan

Network name:

Refresh scan results every 60 seconds

Network Name	BSSID	Ch	RSSI	Security Suite
gridconnect	80:2A:A8:87:0A:F2	11	<div style="width: 100%; height: 10px; background-color: green;"></div> -38	WPA2-CCMP
GC_Guest	82:2A:A8:87:0A:F2	11	<div style="width: 100%; height: 10px; background-color: green;"></div> -39	WPA2-CCMP
Office Speaker.o	FA:8F:CA:38:81:23	6	<div style="width: 100%; height: 10px; background-color: green;"></div> -47	None
gridconnect	80:2A:A8:87:0B:A9	6	<div style="width: 100%; height: 10px; background-color: green;"></div> -55	WPA2-CCMP
Grid Tech Support	00:19:70:4E:8E:5F	9	<div style="width: 100%; height: 10px; background-color: green;"></div> -55	WPA2-CCMP-TKIP
gridconnect	80:2A:A8:88:0A:F2	159	<div style="width: 100%; height: 10px; background-color: green;"></div> -56	WPA2-CCMP
GC_Guest	82:2A:A8:88:0A:F2	159	<div style="width: 100%; height: 10px; background-color: green;"></div> -56	WPA2-CCMP
ngHub 319439NK01CF5	28:C6:8E:D5:20:2C	11	<div style="width: 100%; height: 10px; background-color: green;"></div> -56	WPA2-CCMP
GC_Guest	82:2A:A8:87:0B:A9	6	<div style="width: 100%; height: 10px; background-color: green;"></div> -57	WPA2-CCMP
gridconnect	80:2A:A8:87:0D:9A	1	<div style="width: 100%; height: 10px; background-color: green;"></div> -59	WPA2-CCMP
GC_Guest	82:2A:A8:87:0D:9A	1	<div style="width: 100%; height: 10px; background-color: green;"></div> -60	WPA2-CCMP

admin [\[Logout\]](#)

This page shows a scan of the wireless devices within range of the device.

It reports:

- Network name (Service Set Identifier)(SSID)
- Basic Service Set Identifier (BSSID)
- Channel
- Received Signal Strength Indication (RSSI)
- Security Suite

The icon indicates the active profile.

Click on a network name for QuickConnect configuration.

The selected wireless device connect profile is displayed. Enter required password and click Apply. Clicking on Apply will allow you to try out the settings on the WLAN without saving them to Flash. If the settings do not work, reboot the device to obtain the original settings.

QuickConnect

- Status
- AES Credentials
- Bridge
- CLI Server
- Clock
- Device
- Diagnostics
- Discovery
- File System
- HTTP Server
- Line
- Modbus
- Modem Emulation
- Monitor
- NetDuo

WLAN Profile "gridconnect"

Connect To	
Network Name (SSID):	gridconnect
BSSID:	80:2A:A8:87:0A:F2
Security Suite:	WPA2-CCMP
Signal Strength:	-38

Security	
WPax IEEE 80211r:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Key Type:	<input checked="" type="radio"/> Passphrase <input type="radio"/> Hex
Password:	<input type="password"/>

Advanced

admin [\[Logout\]](#)

Use the **Apply** button to try out settings on the WLAN without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings.

Use the **Submit** button to update the WLAN settings and save them to Flash.

If the connection was successful, the selected WLAN connected profile is displayed.

QuickConnect

- Status
- AES Credentials
- Bridge
- CLI Server
- Clock
- Device
- Diagnostics
- Discovery
- File System
- HTTP Server
- Line
- Modbus
- Modem Emulation
- Monitor
- NetDuo
- Network
- NTP
- Radio
- SNMP
- TLS Credentials
- Tunnel
- User
- WLAN Profiles

WLAN Profile "gridconnect"

Changed WLAN Profile New_Profile Instance to "gridconnect".
Changed WLAN Profile New_Profile Basic Network Name to "gridconnect".
Changed WLAN Profile New_Profile Security Suite to "WPA2".
Changed WLAN Profile New_Profile Security WPAx Passphrase to "<Configured>".
The changes have been successfully applied.
WARNING: The changes will not persist after reboot unless you submit.

Basic	
Network Name (SSID):	gridconnect
State:	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled

Security	
Suite:	WPA2
WPAx IEEE 80211r:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Authentication:	PSK
Key Type:	<input checked="" type="radio"/> Passphrase <input type="radio"/> Hex
Password:	*****

Advanced	
TX Power Maximum:	19 dBm
Power Management:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled

admin [\[Logout\]](#)

Use the **Apply** button to try out settings on the WLAN without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings.

Use the **Submit** button to update the WLAN settings and save them to Flash.

Click Status to display the summary of the connection information.

QuickConnect	<table border="1"> <tr> <th colspan="2">Product Information</th> </tr> <tr> <td>Product Type:</td> <td>xPico240</td> </tr> <tr> <td>Firmware Version:</td> <td>4.6.0.0R7.1</td> </tr> <tr> <td>Serial Number:</td> <td>0080A3CD84DF</td> </tr> <tr> <td>Uptime:</td> <td>40 minutes 35 seconds</td> </tr> <tr> <td>Permanent Config:</td> <td>Unsaved</td> </tr> <tr> <th colspan="2">Network Settings</th> </tr> <tr> <th colspan="2">Interface ap0</th> </tr> <tr> <td>MAC Address:</td> <td>02:80:A3:CD:84:E0</td> </tr> <tr> <td>State:</td> <td>Up</td> </tr> <tr> <td>SSID:</td> <td>NETDUO_CD84DF</td> </tr> <tr> <td>Security Suite:</td> <td>WPA2</td> </tr> <tr> <td>IP Address:</td> <td>192.168.0.1/24</td> </tr> <tr> <th colspan="2">Interface eth0</th> </tr> <tr> <td>MAC Address:</td> <td>00:80:A3:CD:84:DF</td> </tr> <tr> <td>State:</td> <td>Down</td> </tr> <tr> <th colspan="2">Interface wlan0</th> </tr> <tr> <td>MAC Address:</td> <td>00:80:A3:CD:84:E0</td> </tr> <tr> <td>Connection State:</td> <td>Connected</td> </tr> <tr> <td>Active WLAN Profile:</td> <td>gridconnect</td> </tr> <tr> <td>Hostname:</td> <td></td> </tr> <tr> <td>IP Address:</td> <td>172.20.200.58/16</td> </tr> <tr> <td>Default Gateway:</td> <td>172.20.206.252</td> </tr> <tr> <td>Domain:</td> <td></td> </tr> <tr> <td>Primary DNS:</td> <td>172.20.206.2</td> </tr> <tr> <td>Secondary DNS:</td> <td>172.20.206.1</td> </tr> <tr> <td>IPv6 State:</td> <td>Up</td> </tr> </table>	Product Information		Product Type:	xPico240	Firmware Version:	4.6.0.0R7.1	Serial Number:	0080A3CD84DF	Uptime:	40 minutes 35 seconds	Permanent Config:	Unsaved	Network Settings		Interface ap0		MAC Address:	02:80:A3:CD:84:E0	State:	Up	SSID:	NETDUO_CD84DF	Security Suite:	WPA2	IP Address:	192.168.0.1/24	Interface eth0		MAC Address:	00:80:A3:CD:84:DF	State:	Down	Interface wlan0		MAC Address:	00:80:A3:CD:84:E0	Connection State:	Connected	Active WLAN Profile:	gridconnect	Hostname:		IP Address:	172.20.200.58/16	Default Gateway:	172.20.206.252	Domain:		Primary DNS:	172.20.206.2	Secondary DNS:	172.20.206.1	IPv6 State:	Up	admin	[Logout]
Product Information																																																									
Product Type:		xPico240																																																							
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Interface eth0																																																									
MAC Address:		00:80:A3:CD:84:DF																																																							
State:		Down																																																							
Interface wlan0																																																									
MAC Address:		00:80:A3:CD:84:E0																																																							
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Secondary DNS:	172.20.206.1																																																								
IPv6 State:	Up																																																								
Status																																																									
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Monitor																																																									
NETDUO																																																									
Network																																																									
NTP																																																									
Radio																																																									
SNMP																																																									
TLS Credentials																																																									
Tunnel																																																									
User																																																									
WLAN Profiles																																																									

Note that the **Permanent Config** status will be displayed as 'Unsaved'.

Finally, select the **Device** menu option from the left side and click the '[Save]' option in the Permanent Config: field.

The screenshot displays the NETDUO web interface. On the left is a vertical navigation menu with the following items: QuickConnect, Status, AES Credentials, Bridge, CLI Server, Clock, **Device** (highlighted), Diagnostics, Discovery, File System, HTTP Server, Line, Modbus, Modem Emulation, Monitor, NETDUO, Network, NTP, Radio, SNMP, TLS Credentials, Tunnel, User, and WLAN Profiles. The main content area is titled 'Device Status' and contains a table with the following data:

Property	Status
Product Type:	xPico240
Product ID:	Y2
Product SKU:	XPC240100
Antenna:	U.FL
Serial Number:	0080A3CD84DF
Configuration Version:	[unversioned]
Configuration Modified:	Yes
Firmware Version:	4.6.0.0R7.1
Active Partition:	1
Build Date:	Dec 9 2020 (15:19:23)
Bootloader Version:	1.2.0.0R2
Bootloader Date:	Oct 6 2017 07:40:38
Uptime:	12 minutes 6 seconds
Permanent Config:	Unsaved
	[Save]
	[Reboot]
	[Factory Defaults]

At the top of the main content area, there are buttons for 'Status' and 'Firmware Upgrade'. In the top right corner, the user 'admin' is logged in, with a '[Logout]' link. Below the user information, a note states: 'The Save action works like the "write" command. Any cached configuration changes are committed, so they will apply after a reboot. Without a Save, any cached configuration changes are lost after a reboot.'

At this point, the NETDUO is configured and ready to access serial data with a Terminal Emulator program like Teraterm.

2.5 Configuration Steps for Ethernet to Wifi Bridging

To accomplish an Ethernet to Wifi bridge function the Bridge settings and the wireless network interface settings must be configured for proper operation. This assumes the wireless network interface is configured and operational from the previous section(s). The Ethernet to Wifi bridge function is meant for a single host only. To make the bridge settings you should do the following.

Select and click on the **Bridge** menu option (left side). Then click on '**Configuration**' (near top, center) The **Bridge** Configuration window appears.

Choose Interface "wlan0".

The Mode can be "Dynamic" or "Static". In Dynamic mode the NETDUO will automatically detect the MAC address of the host device on the Ethernet side and adopt the MAC for the Wifi side. In Static mode the MAC address of the host device on the Ethernet side can be configured.

The screenshot shows the 'Bridge Configuration' window. On the left is a navigation menu with 'Bridge' selected. The main area has 'Status' and 'Configuration' tabs, with 'Configuration' active. Below the tabs is the title 'Bridge Configuration'. The configuration form includes: 'Interface:' with a dropdown menu set to 'wlan0'; a section header 'Ethernet'; 'Mode:' with a dropdown menu set to 'Dynamic'; and 'Allow All Multicast:' with radio buttons for 'Enabled' (selected) and 'Disabled'. A 'Submit' button is at the bottom. On the right, a sidebar shows the user 'admin' with a '[Logout]' link and explanatory text: 'Interface may be "Disabled", "wlan0" or "ap0". "Disabled" turns bridging off. "wlan0" turns bridging on directed to and from wlan0. Configuration for IP Addressing, Static or Dynamic, must match between the bridged machine and this device. "ap0" turns bridging on directed to and from ap0. The bridged device has its own distinct MAC and IP addresses.'

After making the Bridge configuration settings connect an Ethernet cable between the RJ45 on the NETDUO and the RJ45 on the host device. Verify both devices report an Ethernet link. The NETDUO supports auto-MDI/MDIX so a cross-over cable is not required.

2.6 Configuration Steps for Serial Tunnel

To accomplish a serial tunnel the serial port settings and one of the network interface settings must be configured for proper operation. To make the serial port settings you should do the following.

Select and click on the **LINE** menu option (left side). There are three lines that can be configured. Verify **Line 1** (top, left) is selected. **Line 1** is the physical serial cable to DB9 on the NETDUO.

Then click on '**Configuration**' (near top, center) The **Line 1** Configuration window appears.

The screenshot shows the 'Line 1 Configuration' window. On the left is a navigation menu with 'Line' selected. The main area has tabs for 'Line 1', 'Line Virtual_1', and 'Line Virtual_2', with 'Line 1' active. Below the tabs are 'Status' and 'Configuration' buttons. The 'Configuration' section is a table with the following data:

Configuration	Status
Name:	
Interface:	RS232
State:	Enabled
Protocol:	Tunnel
Baud Rate:	9600 bits per second
Parity:	None
Data Bits:	8
Stop Bits:	1
Flow Control:	None
Gap Timer:	<Four Character Periods> milliseconds
Threshold:	56 bytes
Push:	

On the right side, there is a user menu with 'admin' and a '[Logout]' link, and a note: 'These settings pertain to the Serial Line. Changes take effect immediately.'

The values shown above are the factory default. Match the configuration parameters to your serial device. Set the **State** to Enabled and select "Tunnel" as the **Protocol**.

*Note: if you change a setting, a **Submit** button will appear on the bottom of the window. Click **Submit** to save permanently.*

With a **Line 1: Interface** setting of RS485 you can choose to enable termination using the **NETDUO** menu selection.

The screenshot shows the 'Custom Line 1 Configuration' window. The left navigation menu has 'NetDuo' selected. The main area has a 'Termination' dropdown menu set to 'No'. On the right side, there is a user menu with 'admin' and a '[Logout]' link, and a note: 'NetDuo Line 1 parameters: These changes take effect on the next reboot after Submit. RS485 receiver Termination can be set to Yes or No.'

Next, select the **Tunnel** menu option from the left side. Verify **Tunnel 1** is selected. Select the **Accept** option at the top of the menu and match the following:

Note that we are using port # 10001. This will be used when we use Teraterm to access the NETDUO data port.

Note: Teraterm is a free, downloadable terminal emulation program.

The screenshot shows the NETDUO configuration interface. On the left is a sidebar menu with options like QuickConnect, Status, AES Credentials, Bridge, CLI Server, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modbus, Modem Emulation, Monitor, NetDuo, Network, NTP, Radio, SNMP, TLS Credentials, Tunnel (highlighted), User, and WLAN Profiles. The main area displays the 'Tunnel 1 Accept Configuration' page. At the top, there are tabs for 'Tunnel 1', 'Tunnel Virtual_1', and 'Tunnel Virtual_2'. Below the tabs is a control panel with 'Status' (set to 'Accept'), 'Line' (set to 'Connect'), and 'Packing' (set to 'Disconnect'). The configuration table below has the following settings:

Mode:	Always
Local Port:	10001
Multiple Connections:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Protocol:	TCP
Flush Line:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Block Line:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Block Network:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Password:	

On the right side of the interface, there is a user status 'admin' and a 'Logout' button. Below that, a note states: 'Tunnel Accept controls how a tunnel behaves when a connection attempt originates from the network.'

*Note: if you change a setting, a **Submit** button will appear on the bottom of the window. Click **Submit** to save permanently.*

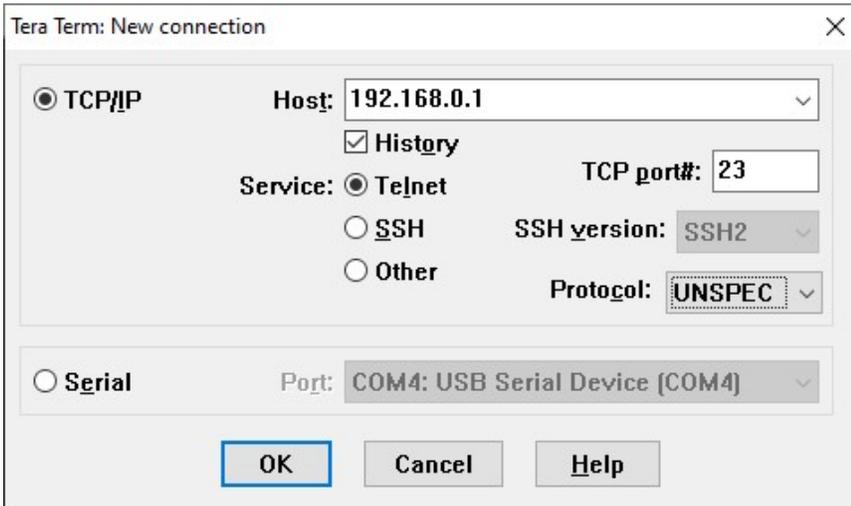
2.6.1 Configuring Teraterm

Teraterm is a free terminal program that can be configured for a TCP/IP or Serial connection. To test the configuration settings of the NETDUO, you can use two instances of Teraterm. One will make a TCP/IP connection to the WiFi side and the other will make a connection to the Serial side. You can test both settings from a single laptop.

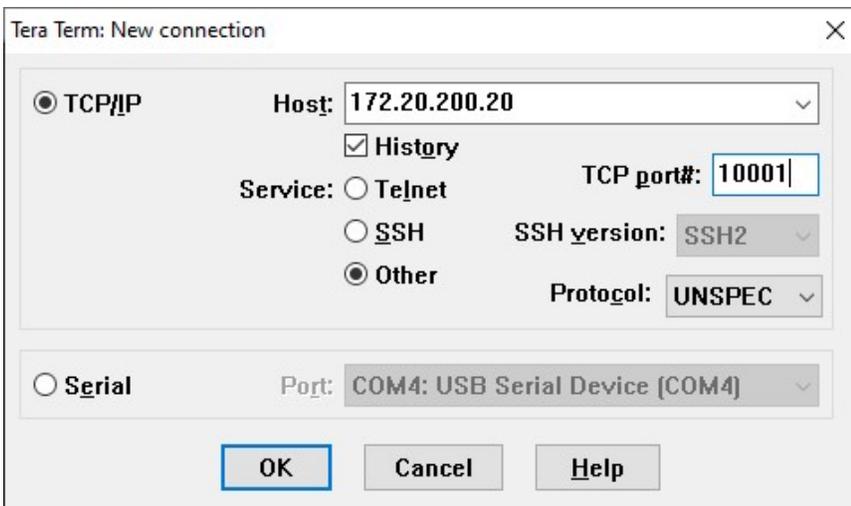
Connect a serial cable from your laptop port to the serial cable on the NETDUO module.

Start up the Teraterm terminal program to open the following window:

Note: the settings shown are for demo purposes.



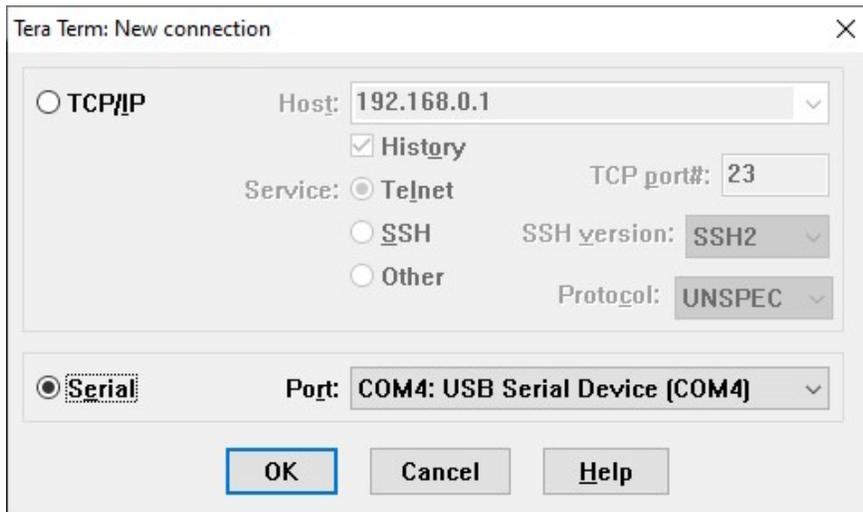
Select the **TCP/IP** radio button and configure the window as shown below. The Host IP address was the one shown in the Status window. The TCP port# was selected in the Tunnel/Accept section.



Click OK and the terminal window appears with the IP address and port settings in the top bar.



Start up another Teraterm terminal program. Click the **Serial** radio button.



Enter the Port number of the connection to the NETDUO serial cable. Click 'OK' and the terminal window appears with the COM port displayed in the top bar.



2.7 Configuration Steps for Modbus Bridge

To accomplish a Modbus/TCP to Modbus serial bridge the serial port settings and one of the network interface settings must be configured for proper operation. To make the serial port settings you should do the following.

Select and click on the **LINE** menu option (left side). There are three lines that can be configured. Verify **Line 1** (top, left) is selected. **Line 1** is the physical serial cable to DB9 on the NETDUO.

Then click on '**Configuration**' (near top, center) The **Line 1** Configuration window appears.

The screenshot displays the 'Line 1 Configuration' window. At the top, there are tabs for 'Line 1', 'Line Virtual_1', and 'Line Virtual_2'. Below these are 'Status' and 'Configuration' buttons. The main configuration area is a table with two columns: 'Configuration' and 'Status'.

Configuration	Status
Name: <input type="text"/>	
Interface: RS232	
State: <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	Enabled
Protocol: Tunnel	Tunnel
Baud Rate: Command Line Modbus ASCII Modbus RTU Modem Emulation	9600 bits per second
Parity: Monitor Mux None	None
Data Bits: 8	8
Stop Bits: 1	1
Flow Control: Trouble Log Tunnel	None
Gap Timer: <Four Character Periods> milliseconds	
Threshold: 513 bytes	
Push: <input type="text"/>	

At the bottom of the configuration area is a 'Submit' button. The right sidebar shows the user 'admin' with a '[Logout]' link and a list of protocols: 'Command Line', 'Modbus ASCII', 'Modbus RTU', 'Modem Emulation', 'Monitor', 'Mux', 'None', 'Trouble Log' or 'Tunnel'. Below this is a detailed description of the selected protocol.

Match the configuration parameters to your Modbus serial server (slave) device. Set the **State** to Enabled and select "Modbus ASCII" or "Modbus RTU" as the **Protocol**. It is necessary to set **Threshold** to 513.

*Note: if you change a setting, a **Submit** button will appear on the bottom of the window. Click **Submit** to save permanently.*

With a **Line 1: Interface** setting of RS485 you can choose to enable termination under the **NETDUO** menu selection.

3. Hardware Description

3.1 Serial Interface

The serial interface is configurable from the web manager for RS232, RS485 half-duplex or RS485 full-duplex operation. The serial cable interface is a 9-pin D-style connector (DB9). The DB9 connector can be used to power the NETDUO with the use of custom wiring to supply adequate power on Pin 9.

3.1.1 RS232

The table below lists the RS232 data and control signals for the NETDUO. Male DB9 connectors are wired as DTE and female DB9 connectors are wired as DCE.

Table 1 – RS232 Data and Control Signals

RS232 Signal	Direction (J4)	DTE DB-9 Male Pin #	DCE DB-9 Female Pin #
Data Out (TXD)	Out (3)	3	2
Data In (RXD)	In (4)	2	3
Ground	(1)	5	5
CTS	In (6)	8	7
RTS	Out (5)	7	8
DSR	In (8)	6	4
DTR	Out (9)	4	6
+5-30Vdc	In (10)	9	9
DCD	In (7)	1	-
Frame Ground	(2)	Shield	Shield

3.1.2 RS485

The table below lists the RS485 half-duplex and full-duplex differential signals for the NETDUO. RS485 termination on the receive pin pairs can be enabled in the web manager under the **NETDUO** selection.

Table 2 – RS485 Signals

RS485 Half-Duplex	RS485 Full-Duplex	DB-9 Male Pin #	DB-9 Female Pin #
	Rx+	3	2
Data+	Tx+	2	3
Signal Ground		5	5
Data-	Tx-	8	7
	Rx-	7	8
		6	4
		4	6
+5-30Vdc (In)		9	9
		1	-
Frame Ground		Shield	

3.2 Power LED, Link LED, and Reset Button

The Reset button is located behind a small hole in the case, to the right of the Ethernet RJ45. The Reset Button should be pressed for 6 seconds with power on and then released to reset the unit to factory default settings.

The power supply LED is located on the end of the module, to the left of the Ethernet RJ45. When power is normal, the GREEN LED will be ON.

The yellow LED is an indicator for the WLAN Link. A lit WLAN LED indicates the WLAN interface is associated with an access point. It does not indicate if the SoftAP is active or not.



3.3 Power Supply

The NETDUO can use any DC power source from 5VDC to 30VDC, marked LPS or Class 2. A typical power cube sent with the unit can supply 9VDC at 500 mA. However, there are other units that can be used as long as they are in the range of 5-30VDC and supply the proper wattage. At 9VDC, the NETDUO will draw approximately 190mA (1.75W typical) so a 3 Watt max power source (9V at 270mA) should be adequate.

NOTE: The NETDUO is designed to be used with any properly rated power adapter from 5VDC to 30VDC, 3W maximum, marked Class 2 or LPS.

NOTE: The NETDUO power adapter is a 2.1mm positive center power jack. The jack is equivalent to a CUI Inc. PJ-002A power jack.

You can also order the NETDUO with a screw terminal block right angle power connector (-TB).

3.4 Technical Specifications

Table 3 - Technical Specs

Category	Description
CPU	ARM Cortex R4 class processor with Flash and SRAM
Firmware	Upgradeable OTA
Reset Circuit	Reset Button
Serial Interface	RS232/RS485 software selectable. Baudrate selectable from 9600 to 921600 bps
Serial Line Formats	7 or 8 data bits, 1-2 Stop bits, Parity: odd, even, none
Wireless LAN	IEEE 802.11 a/b/g/n WLAN interface (2.4 GHz and 5GHz bands supported)
Flow Control	XON/XOFF (software), CTS/RTS (hardware), None
Network Capabilities	Soft Access Point with DHCP Server, supports up to 6 clients
Compatibility	Ethernet: Version 2.0/IEEE 802.3
Network Protocols	IPv4/v6, HTTP, TCP/IP, UDP/IP, SMTP, ARP, ICMP, DHCP, Auto-IP, DNS, SNMPv1/v2

Category	Description
Management	Web Server - Landing Page, Serial CLI, Field upgradable firmware (OTA)
Security	IEEE 802.11i Support – WPA-Personal, WPA2-Personal, WPA2 Enterprise (EAP-TLS, EAP-TTLS, EAP-PEAP, EAP-FAST) SSLv3/TLS 1.2 with PKI and X.509 Certificates (up to 4096-bit Keys) 256-bit AES Encryption
Weight	5.7oz
Material	Case: Flame Retardant
Power	1.75 W typical. See Power Supply section. +5 to +30VDC.
Temperature	Operating range: -40°C to +85°C (-40°F to 185°F)
Relative Humidity	Operating: 0% to 90% non-condensing
Warranty	1-year limited warranty

3.5 Technical Support

If you are experiencing a problem, please read the xPico200 Series User Guide, FAQs and other technical information supplied on our web site (www.gridconnect.com). If you are unable to solve the problem, please contact technical support.

Grid Connect technical support: (630) 245-1445.

Our phone lines are open from 8:00AM - 4:30 PM Central Time Monday through Friday excluding holidays.

4. Compliance Information

Grid Connect is committed to protecting people and the environment and we are working on identifying any materials used in our processes that could pose a potential hazard to our employees, customers or the environment.

In 2005, Grid Connect began the process of converting all of its products to be built without any of the banned materials. The qualification of RoHS-compliant components supplied by our vendors and the implementation of new manufacturing processes related to this Directive are fully implemented.

Grid Connect will attempt to distribute only those products that comply with the RoHS2 Directive, The Waste Electrical and Electronic Equipment Directive (WEEE), The Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) directive, and the Conflict Minerals directive.

4.1 RoHS2

The RoHS Directive, officially known as Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast), was published in the Official Journal of the European Union on July 1, 2011 and entered into force on July 21, 2011.

The restricted substances are:

1. Lead (0.1%)
2. Mercury (0.1%)
3. Cadmium (0.01%)
4. Hexavalent chromium (0.1%)
5. Polybrominated biphenyls (0.1%)
6. Polybrominated diphenyl ethers (PBDE) (0.1%)

The new RoHS Directive, also known as RoHS 2, introduces new CE marking and declaration of conformity requirements. Before placing a product on the market, a manufacturer / importer / distributor must ensure that the appropriate conformity assessment procedure is in line with module A of Annex II to [Decision No 768/2008/EC](#) has been carried out and affix the **CE marking** on the finished product. After January 2013, electronic products bearing the CE Mark must meet the requirements of this new directive.

4.2 WEEE Directive (2002/96/EC)

The Waste Electrical and Electronic Equipment Directive (WEEE) applies to companies that manufacture, sell, distribute, recycle or treat electrical and electronic equipment and to consumers in the E.U. It covers all large and small household appliances, IT equipment, radio and audio

equipment, electrical tools and telecommunications equipment, providing the means to collect and recycle electronics products from consumers at end-of-life.

The Directive aims to reduce the waste arising from electrical and electronic equipment and to improve the environmental performance of all those involved in the life cycle of these products.

The requirement to mark equipment with the WEEE symbol (the crossed-out wheeled bin) went into effect as of August 13, 2005.

All equipment shipped to the EU member states since the date of the directive is marked with the **Wheeled Bin mark**.



Grid Connect has a no-charge “take-back” service that gives customers the option to return used hardware products to be recycled. Products covered by the WEEE directive shipped to EU member states may be returned at no charge. Grid Connect ensures that the products are properly recycled. This service helps reduce the impact on landfills and other disposal sites and provides an environmentally safe end-of-life solution.

To send hardware products to be recycled, customers can contact Grid Connect to obtain an RMA number and we will reply with information on how to ship the product. There is no charge for the disposal but the customer must pay for shipping. After the product is returned, Grid Connect also can provide a Certificate of Custody change upon customer request.

Product “take-back” regulations are constantly evolving. Current regulations do not require Grid Connect to take back its products. However, by launching a WEEE take-back program, Grid Connect demonstrates a commitment to the environment and its customers by helping them dispose of products responsibly.

4.3 REACH

The Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) is a European Community Regulation related to the safe use and identification of chemicals (Regulation (EC) Number 1907/2006). REACH entered into force on June 1, 2007 with the aim of improving the protection of human health and the environment through better and earlier identification of the intrinsic properties of chemical substances. The new legislative framework under REACH shifts responsibility for the control and safety of chemicals from government authorities to industry and created the European Chemicals Agency to act as a central coordinator.

Grid Connect is an importer of articles as defined in the Regulation. However, registration requirements under Article 7 of REACH do not currently apply to articles imported by Grid Connect into the European Union because:

1. Substances are not present in the articles in quantities totaling over one ton per year
2. Substances are not intended to be released under normal or reasonably foreseeable conditions of use.

Grid Connect is not categorized as a downstream user under REACH because it does not use the substances in the course of its professional activities and therefore has no applicable requirements under Article 37 of REACH. Grid Connect will continue to monitor REACH developments and will comply with any applicable requirements.

As Substances of Very High Concern (SVHCs) are added to Annex XIV of the Regulation (Authorization List), Grid Connect will assess whether both of the following conditions are met:

1. The substance is present in the articles in quantities over one (1) ton per year
2. The substances are present in Grid Connect devices above a concentration level of 0.1% w/w

Grid Connect shall comply with the requirements of Article 7(2) and Article 33 of the Regulation, as necessary. For informational purposes, Grid Connect has contacted its material and manufacturing vendors to verify that Grid Connect devices do not contain SVHCs.

4.4 Conflict Minerals

The US Securities and Exchange Commission (SEC) issued their long awaited conflict minerals rule as required per Section 1502 of the Dodd Frank Financial Dodd-Frank Wall-Street (Financial) Reform and Consumer Protection Act. The aim of the rule is to stop companies from sourcing minerals from regions in the world where armed conflict and human rights abuses are occurring, and armed rebel groups perpetuating the conflict/abuses are profiting from it. The region specifically targeted in the rule is the Democratic Republic of Congo (DRC) and surrounding region.

The new rule requires **SEC registered companies** to annually determine if any tin, tantalum, tungsten, or gold (and their derivatives) was added to/used in their products. If so, they must conduct a reasonable country of origin inquiry (RCOI) to determine whether the mineral(s) used came from a conflict-free source (i.e. from outside the DRC region or from a conflict free smelter located in the DRC region). Affected companies must annually report the results of their RCOI to the SEC. **Grid Connect is not an SEC registered company and is not required to file a report.**

Grid Connect supports the conflict minerals rules and requires all suppliers of any fabricated materials such as Printed Circuit Boards to be monitored.

Grid Connect is committed to sourcing responsibly and considers mining activities that fuel conflict as unacceptable. Grid Connect's efforts related to conflict minerals are aligned to the work

of the Electronic Industry Citizenship Coalition® (EICC®) and Global e-Sustainability Initiative (GeSI). The EICC's and GeSI's work includes the Conflict-Free Smelter Program and the Conflict Minerals Reporting Template. The Template provides a common industry approach for the collection of sourcing information related to conflict minerals. The template is available by contacting Grid Connect.

4.5 ISO 9000

ISO 9000 registration (or EN 29000 certification) is used widely in Europe on a voluntary basis as a condition of acceptance of a manufacturer's product or as a way of recognizing the manufacturer's credibility. While a quality system such as ISO 9000 indicates that a company has an efficient organization structure and has low failure costs, it does not always certify conformity with the CE marking directives. However, some directives require use of a quality management system as part of the conformity assessment.

Grid Connect Inc. is committed to providing excellent products and services and creating a pleasant and stimulating working environment for its employees and those with whom it does business.

The company recognizes that the disciplines of quality, health, safety and environmental management are an integral part of its management function. The company views these as a primary responsibility and believes that a key to good business is maintaining the appropriate quality standard, ISO 9001:2015.

In pursuit of our policy we will:

- Comply with all applicable statutory laws, statutory regulations and with the requirements of ISO 9001:2015.
- Follow a concept of continual improvement and make best use of our management resources in all quality matters.
- Communicate our quality objectives and our performance against these objectives throughout the company and to interested parties.
- Take due care to ensure that activities are safe for employees, associates, subcontractors and others who come into contact with our workplace.
- Work closely with our customers and suppliers to establish the highest quality standards and to ensure customer satisfaction.
- Adopt a forward-looking view on future business decisions, which may have quality impacts.
- Train our staff in the needs and responsibilities of quality management.
- Recycle electronics, paper, plastics, metal, and glass through recycling facilities and donation centers.

4.6 Compliance Statements for vendor supplied products.

4.6.1 Compliance Statement for the xPico 200 Series

(According to ISO/IEC Guide and EN 45014)

Manufacturer's Name & Address:

Lantronix, Inc., 7535 Irvine Center Drive, Suite 100, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: xPico 200

Conforms to the following standards or other normative documents:

Table 11-1: Country Certifications (xPico 240/250/270)

Country	Specification	xPico 240	xPico 250	xPico 270
USA 	FCC Part 15, Subpart B, Class B FCC Part 15, Subpart C 15.247 (WLAN) FCC Part 15, Subpart C 15.247 (BT) FCC Part 15, Subpart E 15.407 (DFS)	Yes	Yes	Yes
Canada	ICES-003:2012 Issue 5, Class B RSS-Gen, Issue 4, 2014-11 RSS-102, Issue 5, 2015-03 RSS-247, Issue 2, 2017-02	Yes	Yes	Yes
EU	See EU Declaration of Conformity below.	Yes	Yes	Yes
Australia, New Zealand  N11206	AS/NZS 4268 2017 AS/NZS 2772.2	Yes	Yes	Yes
Japan	ARIB STD-T66(v3.7), MIC notice 88 Appendix 43 ARIB STD-T71(v6.1), MIC notice 88 Appendix 45	Yes	Yes	**
China	SRRC	Yes	Yes	**
India	WPC ETA	**	Yes	Yes
Taiwan	LP002	**	Yes	Yes
Mexico	NOM, IFETEL	**	Yes	Yes
Safety	EN 62368-1	Yes	Yes	Yes

**For additional regional certification requests please contact Grid Connect.

4.7 UL Certificate

TBD