

Application Note

**Sample Programs for Using the
Lantronix® xPico® Wi-Fi® Shield**

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Lab Setup

The following labs provide examples on how to use the xPico® Wi-Fi® Shield to connect an xPico Wi-Fi embedded device server to an Arduino® micro-computer board. These examples use Arduino Uno, however other Arduino platforms may be utilized. The firmware may change slightly.

Prior to running the labs, download and install the open-source Arduino IDE from the Arduino website: <http://arduino.cc/en/Main/Software#.UwYZNvidVKY>

In order to be able to create a virtual com port from a USB port it is also recommended that you install or update FTDI drivers on your personal computer from this website: <http://www.ftdichip.com/Drivers/VCP.htm>

Jumper Settings

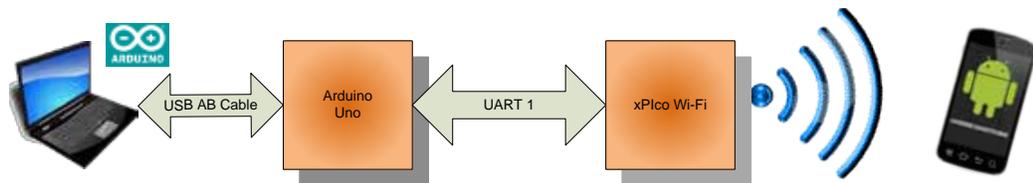
This example does not require changing or modifying the xPico Wi-Fi Shield jumpers from their default settings. The default jumper settings for the xPico Wi-Fi Shield are described in [Table 1](#) below. For more information about these jumpers, refer to the *xPico Wi-Fi Shield User Guide* (part number 900-709-R).

Table 1 Jumper Settings

JP: Position	Position	Label	Function
JP17: 1-2	Installed	WLAN LED	Install to use WLAN LED
JP17 : 3-4	Installed	WAKE	Install to use wake-up input and button, SW 1
JP17: 5-6	Installed	RXD2	Install to route xPico Wi-Fi module second serial port to J9 via the on board USB to serial converter
JP17: 7-8	Installed	TXD2	Install to route xPico Wi-Fi module second serial port to J9 via the on board USB to serial converter
JP17: 9-10	Installed	DEFAULTS	Install to use Defaults input and button, SW 2
JP17: 11-12	Installed	RESET	Install to use Hardware Reset input and button, SW 3
JP3: 2-3	Installed	TX	Install position 2-3 to connect xPico module TXD1 to Arduino computer board serial RX. Install position 1-2 to connect xPico module RXD1 to Arduino computer board serial RX.
JP5: 2-3	Installed	RX	Install position 2-3 to connect xPico module RXD1 to Arduino computer board serial TX. Install position 1-2 to connect xPico module TXD1 to Arduino computer board serial TX.
JP2 1-2	Installed	CP1	Breakout header for CP1, pin 2 does not connect anywhere else on the board.
JP2 3-4	Installed	CP2	Breakout header for CP2
JP2 5-6	Installed	CP3	Breakout header for CP3
JP2: 7-8	Installed	CP4	Breakout header for CP4

JP: Position	Position	Label	Function
JP2: 9-10	Installed	CP5	Breakout header for CP5
JP2: 11 – 12	Installed	CP6	Breakout header for CP6
JP2 13 - 14	Installed	CP7	Breakout header for CP7
JP2: 15 - 16	Installed	CP8	Breakout header for CP8
JP2: 17 – 18	Installed	RTS1	Header for RTS1, pin 18 does not connect anywhere else on the board.
JP2: 19 - 20	Installed	CTS1	Header for CTS1, pin 20 does not connect anywhere else on the board.
JP6: 1 – 2	Installed	Power	Install pins 1-2 to power shield board from Arduino computer board
JP10: 1 - 2	No Jumper	3.3V	3.3V power generated by the on board regulator
JP11: 1- 2	No Jumper	GND	Board signal ground.

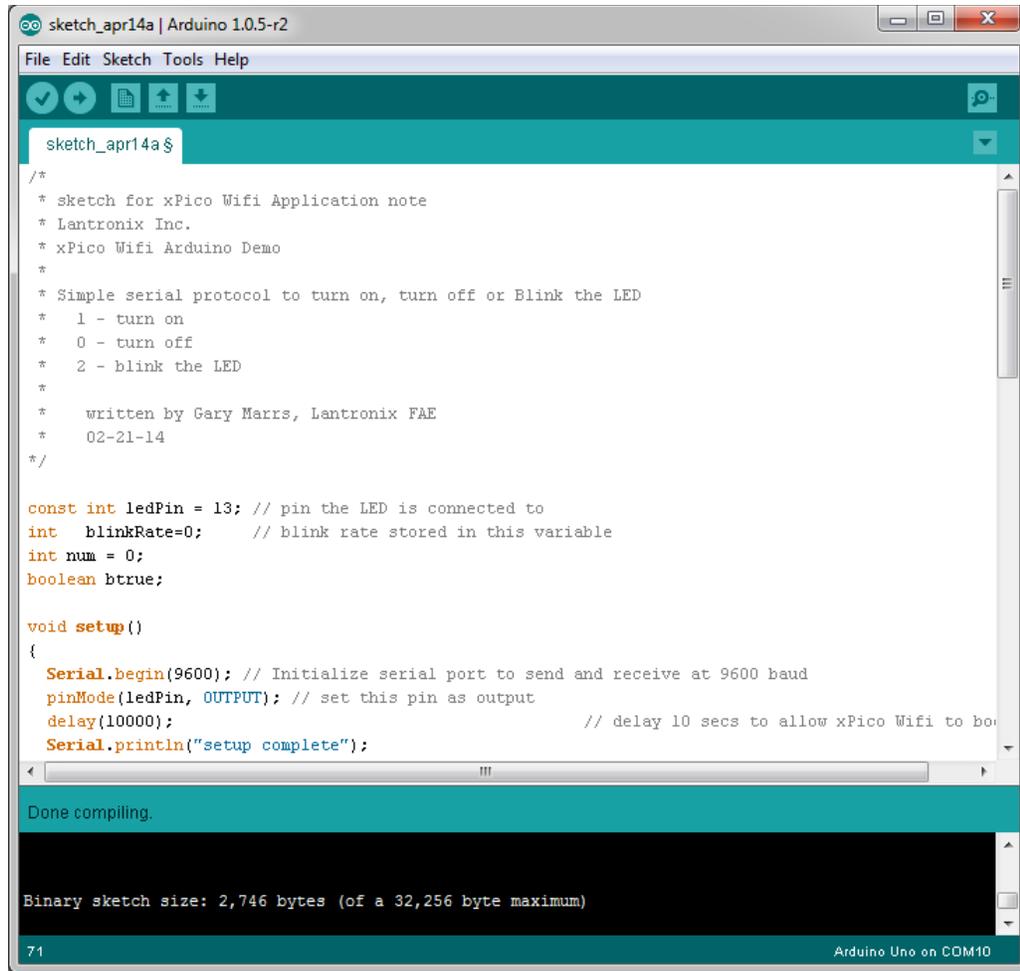
Lab 1: Using a Mobile Application to Control an LED on Arduino Uno MCU.



The sample sketch and Android Application (APK) used in this Lab can be downloaded from the Lantronix Website: <http://www.lantronix.com/resources/appnotes.html>

For information and instructions on how to side load the APK file onto an Android device please refer to one of the many excellent articles available on the internet, for example: <http://phandroid.com/2013/07/20/android-101-sideloadng-apps/>

1. Connect the system as shown in the figure above.
2. In Arduino IDE, click on **File -> Open**.
3. In the dialog box that comes up, navigate to the directory and select file “**xxxx**” and click **Open**. The IDE should now display the sketch for the sample application.
4. Click **Sketch** and select **Verify/Compile**.
5. Alternatively, click on the **Upload** icon on the IDE toolbar. This will compile and download the sample code onto the Arduino board.



If the sketch compiles successfully, you will see the status bar indicate, “Done compiling”. Then the console box will indicate the following:

Binary sketch size: 2,746 bytes (of a 32,256 byte maximum)

Note: Your actual byte counts may differ depending on the application and actual Arduino hardware utilized.

To interact with the Arduino application from a Wi-Fi connected host, there are 2 options. You can either open a Telnet session to the xPico Wi-Fi module interface or you can load the Android application to display a simple IDE.

1. Load the application onto an Android device.
2. Make sure that your Android device’s Wi-Fi is connected to the xPico Wi-Fi device’s Soft AP:
3. Look for the SSID **xPicoWiFi_XXXXXX** where the last 6 characters are the last 6 characters of the xPico Wi-Fi device serial number.
4. Enter the Wi-Fi password. The default Wi-Fi password is **XPICOWIFI**.

The Android app will provide a graphical user interface that will allow the user to toggle the Arduino LED as well as provide feedback on its current setting.

Lab 1 Sample Code

```
/*
 * sketch for xPico Wifi application note
 * Lantronix Inc.
 * xPico Wifi Arduino Demo
 *
 * Simple serial protocol to turn on, turn off or Blink the LED
 * 1 - turn on
 * 0 - turn off
 * 2 - blink the LED
 *
 * written by Gary Marrs, Lantronix FAE
 * 02-21-14
 */

const int ledPin = 13; // pin the LED is connected to
int blinkRate=0; // blink rate stored in this variable
int num = 0;
boolean btrue;

void setup()
{
  Serial.begin(9600); // Initialize serial port to send and receive at
  9600 baud
  pinMode(ledPin, OUTPUT); // set this pin as output
  delay(10000); // delay 10 secs to allow xPico Wifi to boot
  up
  Serial.println("setup complete");
}

void loop()
{
  if ( Serial.available() ) // Check to see if at least one character is
  avail
  {
    //Serial.println("read available");
    char ch = Serial.read();

    if( isDigit(ch) ) // is this an ascii digit between 0 and 9?
    {
      num = (ch - '0'); // 0 turn off LED
      //Serial.print("num = ");
      //Serial.println(num);
      if (num == 0){
        btrue = false;
        digitalWrite(ledPin,LOW);
        Serial.println("0");
      }
      if (num == 1){ // 1 turn on LED
        btrue = false;
        digitalWrite(ledPin,HIGH);
        Serial.println("1");
      }
      if (num == 2) { // blink LED
        blinkRate = 400; // actual rate is 100mS times received
        digit
        btrue = true;
        Serial.println("2");
      }
    } // end of if

  } // end of serial available if
```

```

    if(btrue)
    blink();

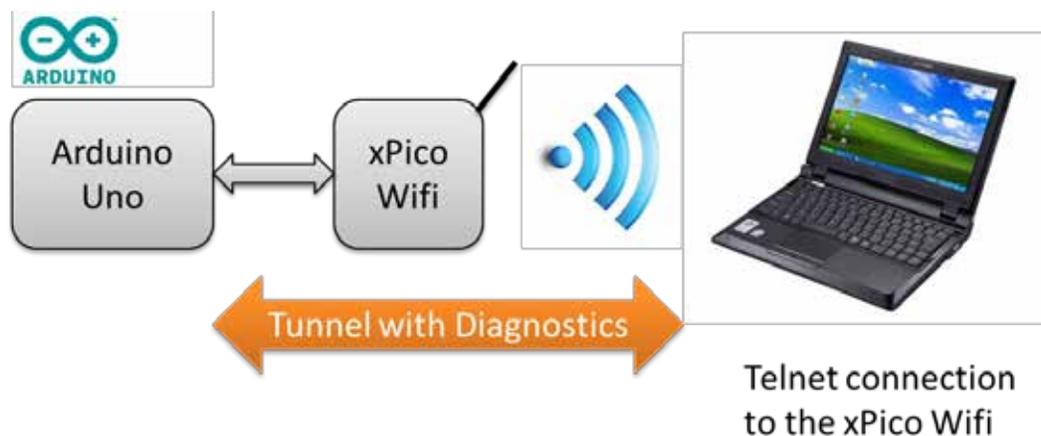
} // end of loop

// blink the LED with the on and off times determined by blinkRate
void blink()
{
    digitalWrite(ledPin,HIGH);
    delay(blinkRate); // delay depends on blinkrate value
    digitalWrite(ledPin,LOW);
    delay(blinkRate);
}

```

Lab 2: Connect xPico Wi-Fi Device to an Infrastructure Network

This Lab will connect the xPico Wi-Fi device to an infrastructure network and provide network and wireless connection diagnostics.



1. By default, the Soft AP mode is enabled with a default SSID of **xPicoWiFi_xxxxxx**, where **xxxxxx** are the last six characters of the unique xPico Wi-Fi serial number. This number is available on the module label.
2. Connect your device to the xPico Wi-Fi device's Soft AP SSID. The default password is **XPICOWIFI**.
3. Open a standard browser and in the address field of the browser enter the following URL: xpicowifi.lantronix.com or alternatively use 192.168.0.1 as the IP Address.
4. When prompted enter the username, **admin** and the password, **PASSWORD** to access the configuration and management web pages.

xPico™ Wi-Fi LANTRONIX

QuickConnect
Status (Home icon)
 Filesystem
 HTTP
 Line
 Network
 System
 Tunnel
 WLAN Profiles

Product Information

Product Type:	xPicoWiFi
Firmware Version:	1.0.0.0R5
Build Date:	Jun 12 2013 (17:01:35)
Serial Number:	0060A36010B
Uptime:	0 days 02:44:43
Permanent Config:	saved

Network Settings

Interface (ap0)

State:	Up
SSID:	XpicoWiFi_90010B
Security Suite:	WPA2
IP Address:	192.168.0.1

Interface (wlan0)

Connection State:	Connected
Radio Firmware Version:	2.2.1
Active WLAN Profile:	skynet
IP Address:	172.19.100.69/16
Default Gateway:	172.19.0.1
Hostname:	
Primary DNS:	172.19.1.1
Secondary DNS:	172.19.1.2

Line Settings

Line 1:	9600, None, 8, 1, None Tunnel
Line 2:	9600, None, 8, 1, None Trouble Log
Tunnelling:	Accept Mode
Tunnel 1:	Waiting

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- Click on **QuickConnect** on the left side bar.

xPico™ Wi-Fi LANTRONIX

QuickConnect (Arrow)
 Status (Home icon)
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 HTTP
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 WLAN Profiles

WLAN Link Scan

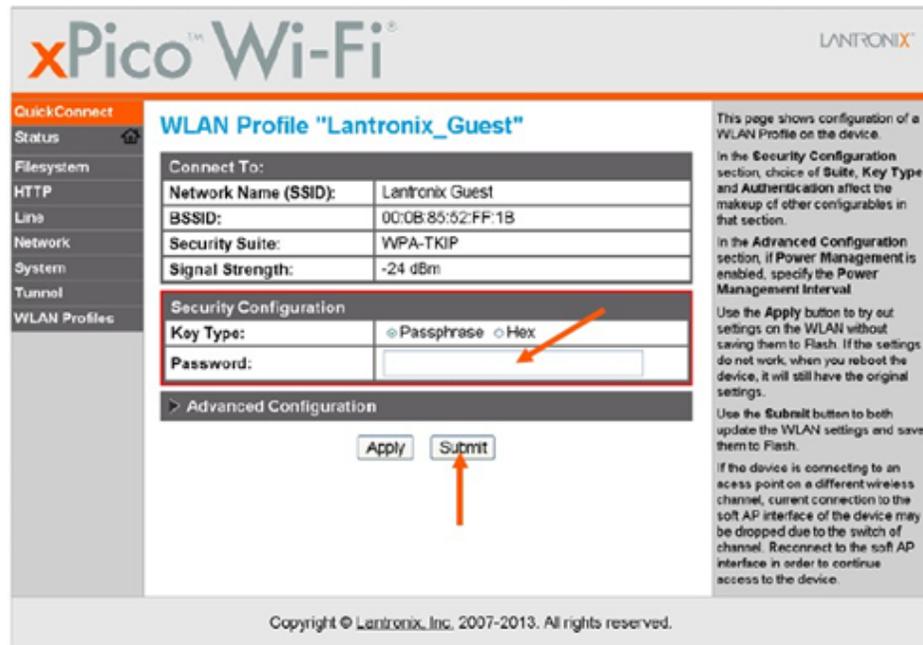
Network name:

Network Name	BSSID	Ch	RSSI	Security Suite
Lantronix Guest	00:0B:85:52:FF:1B	1	█ -24 dBm	WPA-TKIP
LantronixWPA	00:0B:85:52:FF:1D	1	█ -25 dBm	WPA-TKIP
LantronixVoice	00:0B:85:52:FF:1C	1	█ -26 dBm	WEP
Mart	30:46:9A:F9:A9:03	3	█ -40 dBm	WPA2-CCMP
vader	C0:8A:DE:B1:08:89	10	█ -44 dBm	WPA2-CCMP
wpa2_subhe	C0:8A:DE:71:08:88	10	█ -44 dBm	WPA2-CCMP
wpa_tkip	C0:8A:DE:04:08:89	10	█ -44 dBm	WPA-TKIP

This page shows a scan of the wireless devices within range of the device. Up to 20 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 any network name for QuickConnect configuration.

- Upon selection of the **QuickConnect** option, the xPico Wi-Fi device scans and displays up to 20 wireless devices in order of strongest signal strength at the top.

7. Click on a network name to view the connection to the desired Access Point. The Access Point will display.
8. Enter the password and click **Submit** to directly connect to the Access Point and to add the profile and configuration details to the WLAN profiles.



9. Click on **Status**, then look for the IP address under Interface (wlan0) to see the IP address assigned to the xPico Wi-Fi device by the infrastructure network. You may now connect to the xPico Wi-Fi device from the infrastructure side and the Soft AP side.
10. Access the Tunnel Accept page by clicking **Tunnel** on the left side bar, then **Accept** near the top of the page. This is where you enter configurations for future labs:
 - a) Mode: **Always**
 - b) Local Port: **10001**
 - c) Protocol: **TCP**
 - d) Flush Line: **Enabled**
 - e) Block Line and Network: **Disabled**
11. Access the Tunnel Disable page by clicking **Tunnel** on the left side bar, then **Disable** near the top of the page to enter the following configurations:
 - a) Stop Character: **<control>A**
 - b) Flush Stop Character: **Enabled**
 - c) Timeout: **10000**
 - d) Flush Line: **Enabled**
12. Create a Telnet session to the IP address of the xPico Wi-Fi device.
13. Enter a **5** to get to the network status.