Programming your radio for home use

This guide will show you how to use the 2017 FRC Radio Configuration Utility software to configure your robot's wireless bridge for use outside of FRC events.

Before you begin using the software:

1. Disable WiFi connections on your computer, as it may prevent the configuration utility from properly communicating with the bridge
2. Make sure no devices are connected to your computer via ethernet, other than the wireless bridge. **Note that for the OM5P-AN and AC bridge, you must use a particular Ethernet port. See the on screen image and instructions for more information.**

The OM5P-AN and AC use the same power plug as the D-Link DAP1522, however they are 12V radios. Wire the radio to the 12V 2A terminals on the VRM (center-pin positive).

Note: Teams will need to update firmware on both OM5P-AN and OM5P-AC radios in order for the programming utility to program them, or for them to be used at events. This must be done before you attempt to program them.

Pre-Requisites

The 2017 FRC Radio Configuration Utility requires the Java Runtime Engine (JRE). If you do not have Java installed, you can download the JRE from here: https://www.java.com/en/download/

The FRC Radio Configuration Utility requires Administrator privileges to configure the network settings on your machine. The program should request the necessary privileges automatically (may require a password if run from a non-Administrator account), but if you are having trouble, try running it from an Administrator account.

Application Notes

By default, the 2017 Radio Kiosk will program the radio to enforce the 7Mbps bandwidth limit on traffic exiting the radio over the wireless interface. In the home configuration (AP mode) this is a total, not a per client limit. This means that streaming video to multiple clients is not recommended.

The 2017 Kiosk has been tested on Windows 7, 8 and 10. It may work on other operating systems, but has not been tested.

Programming your radio for home use

Programmed Configuration

Power	
Blue	On or Powering Up
Blue Blinking	Powering Up
Eth Link	
Blue	Link Up
Blue Blinking	Traffic Present
WiFi	
	Bridge Mode, Unlinked or non-FRC
Off	firmware
Red	AP, Unlinked
Yellow\Orange	AP, Linked
Green	Bridge Mode, Linked

WiFi light only works after radio has been power cycled.
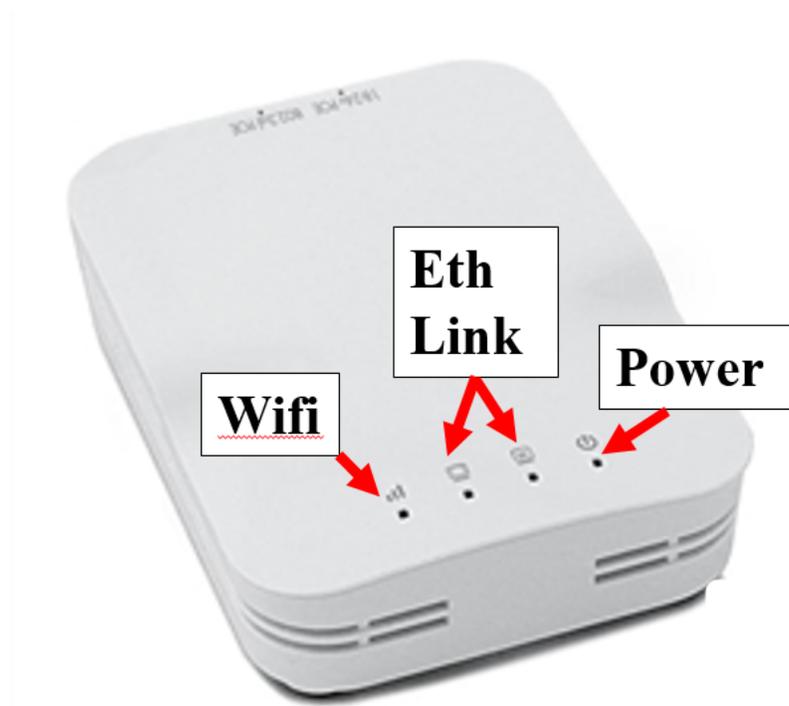
The Radio Configuration Utility programs a number of configuration settings into the radio when run. These settings apply to the radio in all modes (including at events). These include:

- Set a static IP of 10.TE.AM.1
- Set an alternate IP on the wired side of 192.168.1.1 for future programming
- Bridge the wired ports so they may be used interchangeably
- The LED configuration noted in the graphic above. **This is different than the 2016 LED configuration.**
- 7Mb/s bandwidth limit on the outbound side of the wireless interface (may be disabled for home use)
- QoS rules for internal packet prioritization (affects internal buffer and which packets to discard if bandwidth limit is reached). These rules are Robot Control and Status (UDP 1110, 1115, 1150) >> Robot TCP & Network Tables (TCP 1735, 1740) >> Bulk (All other traffic). (disabled if BW limit is disabled)

In AP mode only:

- DHCP server enabled. Serves out 10.TE.AM.11 - 10.TE.AM.111 on the wired side, 10.TE.AM.130 - 10.TE.AM.230 on the wireless side, subnet mask of 255.255.255.0, broadcast address 10.TE.AM.255
- DNS server enabled. DNS server IP and domain suffix (.lan) are served as part of the DHCP.

Programming your radio for home use

At home only:

- SSID may have a "Robot Name" appended to the team number to distinguish multiple networks.
- Firewall option may be enabled to mimic the field firewall rules (open ports may be found in the Game Manual)

Note: It is not possible to modify the configuration manually for the OM5P-AC

Download the software

Download the latest FRC Radio Configuration Utility Installer by clicking the release name, then the filename from the WPILib project File Releases. Note, checking and using "Download Selected" from the Releases section, or using Download Release from the individual release page will download a zip file with both the regular and Israel installers.

Note: The _IL version is for Israel teams and contains a version of the OM5PAC firmware with restricted channels for use in Israel.

# Programming your radio for home use

Install the software

Double click on FRC_Radio_Configuration_VERSION.exe to launch the installer. Follow the prompts to complete the installation.

Part of the installation prompts will include installing WinPCap if it is not already present. The WinPCap installer contains a checkbox (checked by default) to start the WinPCap driver on boot. You should leave this box checked.
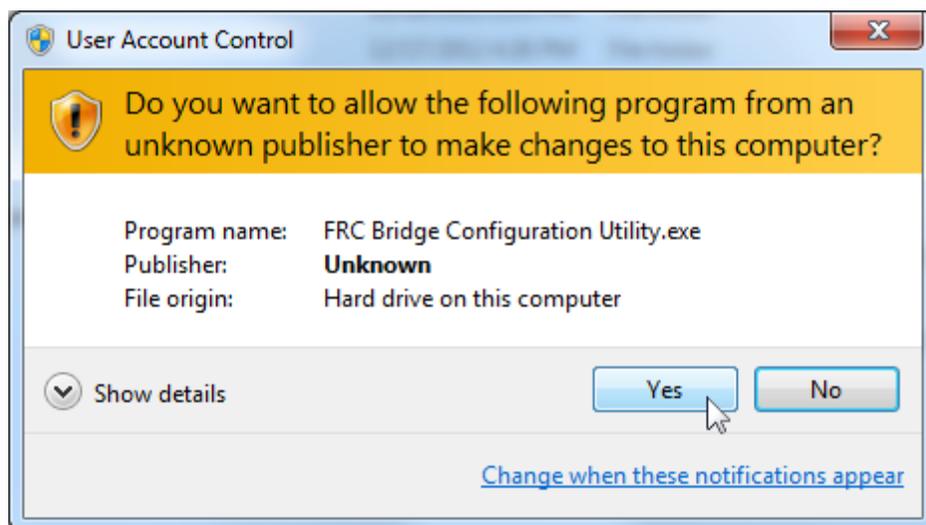
Launch the software
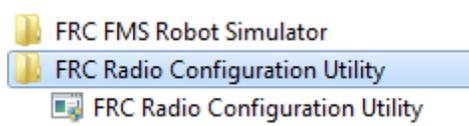
Use the Start menu or desktop shortcut to launch the program.

Note: If you need to locate the program it is installed to C:\Program Files (x86)\FRC Radio Configuration Utility. For 32-bit machines the path is C:\Program Files\FRC Radio Configuration Utility\
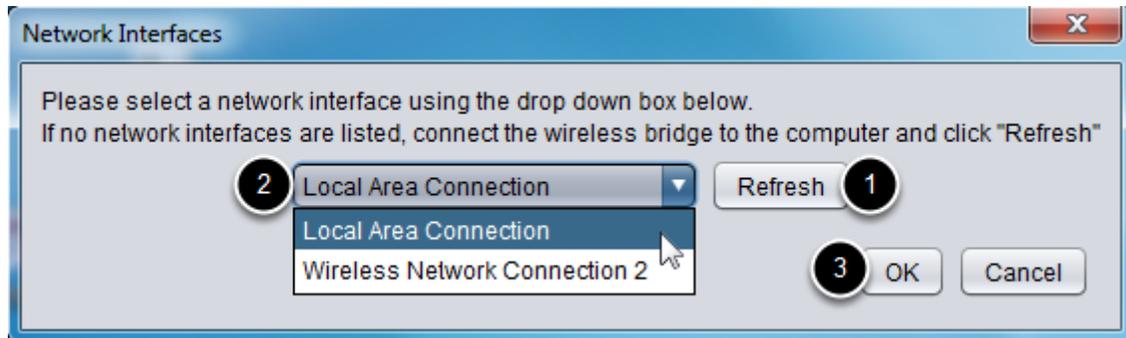
Allow the program to make changes, if prompted

Programming your radio for home use

If the your computer is running Windows Vista or Windows 7, a prompt may appear about allowing the configuration utility to make changes to the computer. Click "Yes" if the prompt appears.

Select the network interface

Use the pop-up window to select the which ethernet interface the configuration utility will use to communicate with the wireless bridge. On Windows machines, ethernet interfaces are typically named "Local Area Connection". The configuration utility can not program a bridge over a wireless connection.

1. If no ethernet interfaces are listed, click "Refresh" to re-scan for available interfaces
2. Select the interface you want to use from the drop-down list
3. Click "OK"

Open Mesh Firmware Note

For the FRC Radio Configuration Utility to program the OM5P-AN and OM5P-AC radio, the radio must be running an FRC specific build of the OpenWRT firmware. OM5P-AC radios with the received firmware must be updated, the Radio Configuration Utility should throw an "old firmware" notification if it is not. OM5P-AN radios must be updated to the new firmware in order for the utility to program them, they will not be detected by the utility if you attempt to Configure before updating.

If you do not need to update or re-load the firmware, skip the next step.

Programming your radio for home use

## Loading FRC Firmware to OpenMesh radio
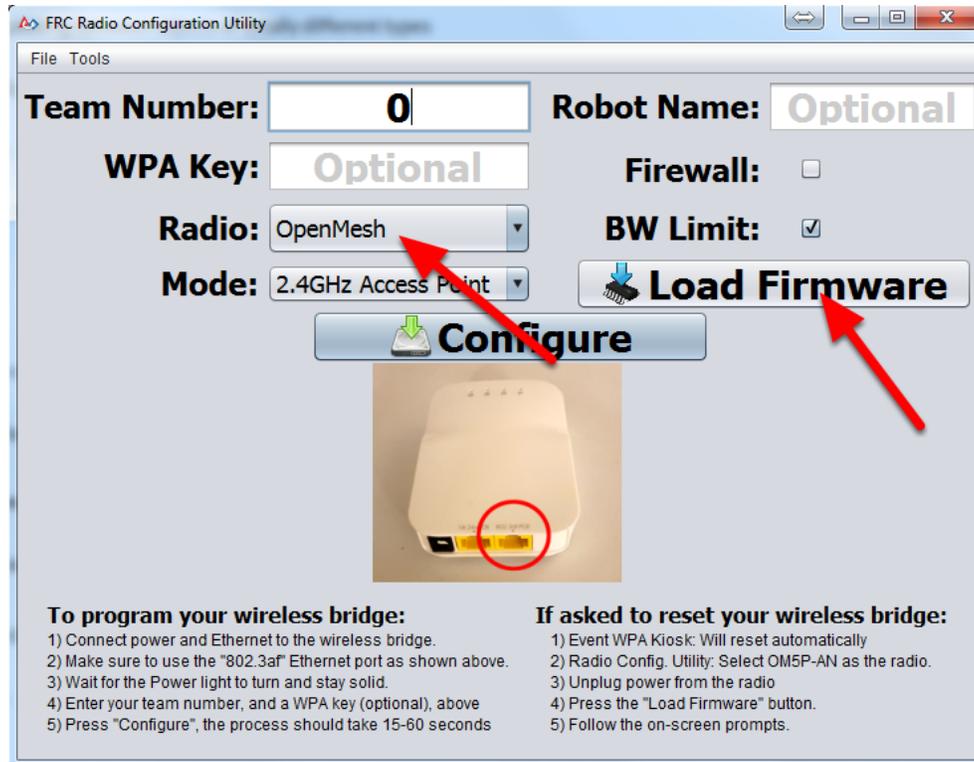
If you need to load the FRC firmware (or reset the radio), you can do so using the FRC Radio Configuration Utility.

1. Follow the instructions above to install the software, launch the program and select the Ethernet interface.
2. Make sure the OpenMesh radio is selected in the Radio dropdown.
3. Make sure the radio is connected to the PC via Ethernet.
4. Unplug the power from the radio
5. Press the Load Firmware button
6. When prompted, plug in the radio power. The software should detect the radio, load the firmware and prompt you when complete.

Programming your radio for home use

Select a bridge model and operating mode
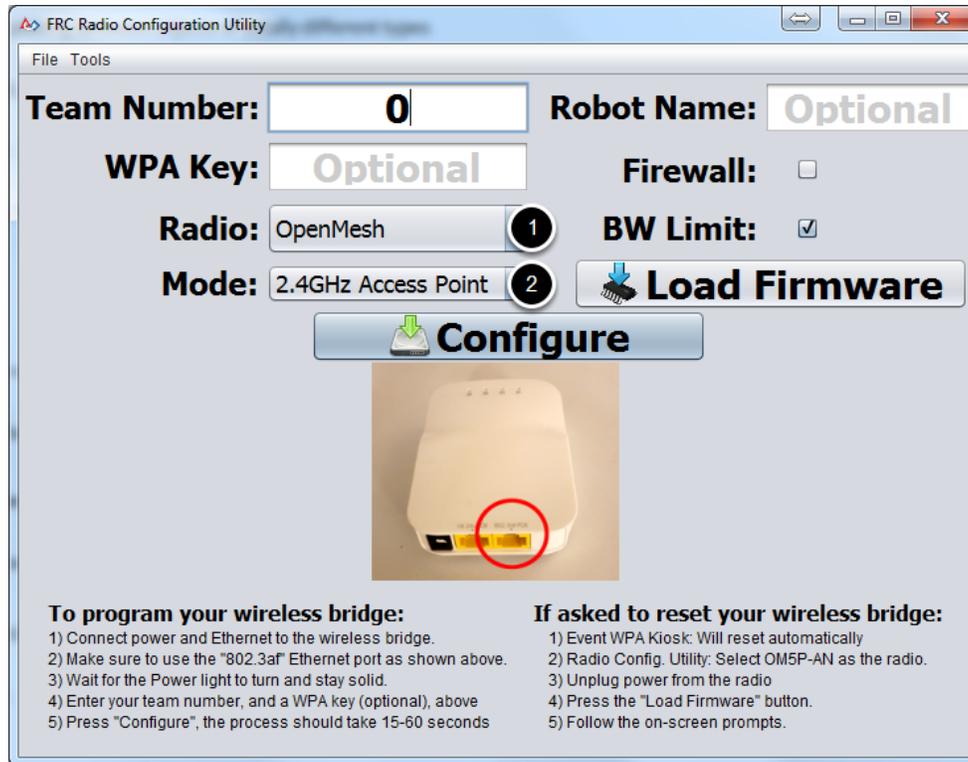
1. Select which radio you are configuring using the drop-down list.
2. Select which operating mode you want to configure. For most cases, the default selection of 2.4GHz Access Point will be sufficient. Note that the 2.4GHz + 5GHz simultaneous AP mode is not supported by the D-Link radios.

Programming your radio for home use

Select Options

The default values of the options have been selected to match the use case of most teams, however, you may wish to customize these options to your specific scenario:

1. Robot Name: This is a string that gets appended to the SSID used by the radio. This allows you to have multiple networks with the same team number and still be able to distinguish them.
2. Firewall: If this box is checked, the radio firewall will be configured to attempt to mimic the port blocking behavior of the firewall present on the FRC field. For a list of open ports, please see the FRC Game Manual.
3. BW Limit: If this box is checked, the radio enforces a 7MB/s bandwidth limit like it does when programmed at events. Note that in AP mode, this is a total limit, not per client, so streaming video to multiple clients simultaneously may cause undesired behaviour.

Note: Firewall and BW Limit only apply to the OpenMesh radios. These options have no effect on D-Link radios.
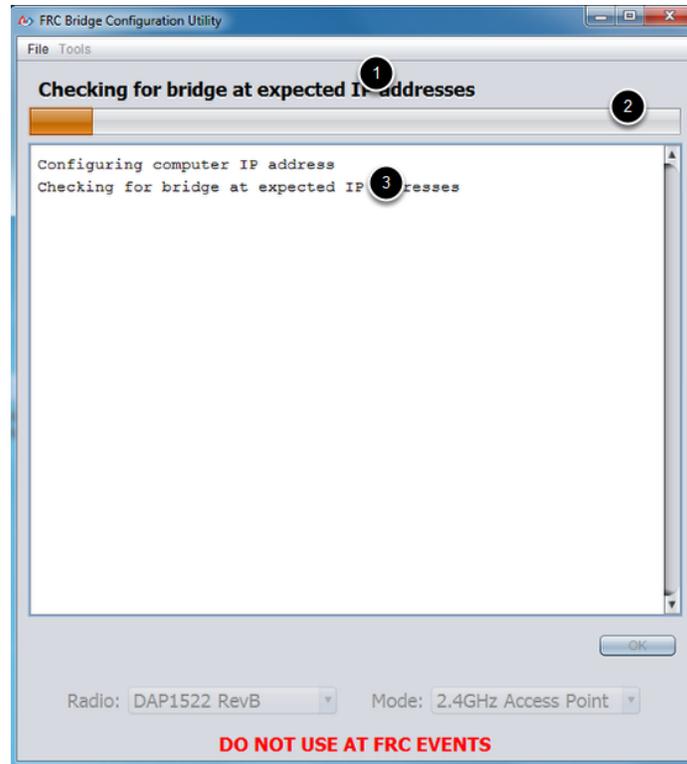
Programming your radio for home use

Prepare and start the configuration process
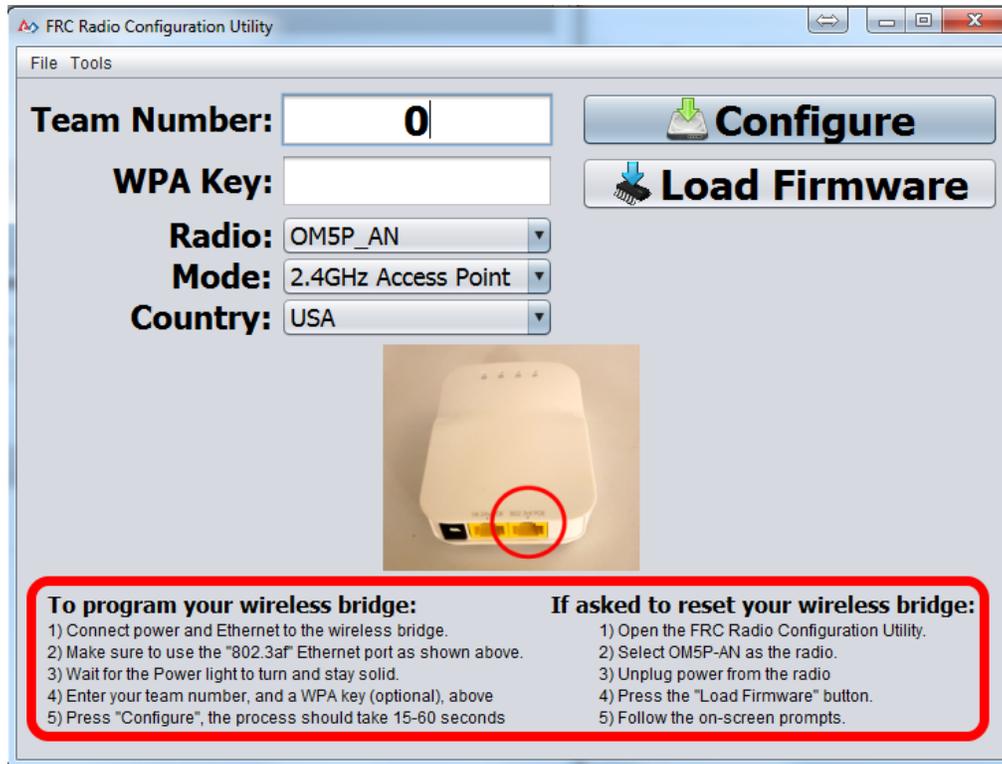
Follow the on-screen instructions for preparing your wireless bridge, entering the settings the bridge will be configured with, and starting the configuration process. These on-screen instructions update to match the bridge model and operating mode chosen.

Programming your radio for home use
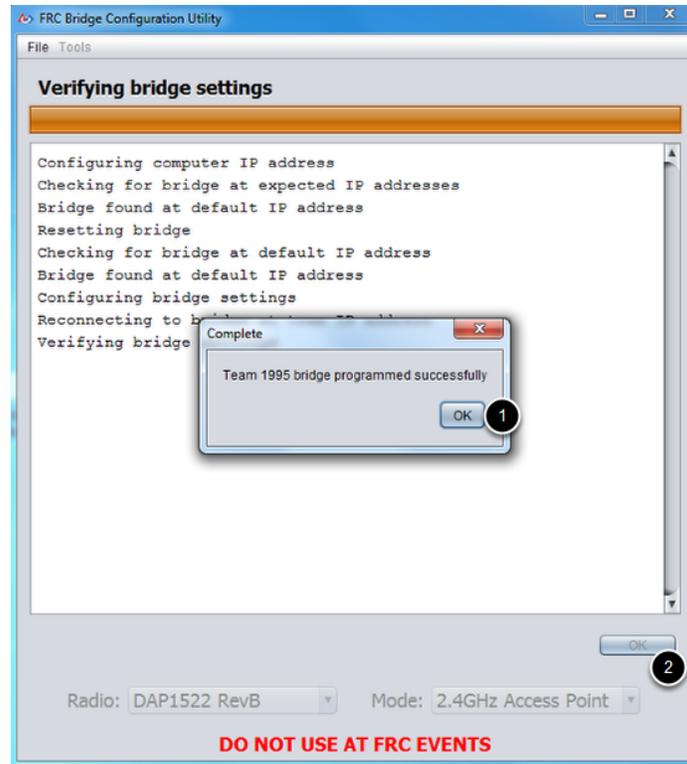
Configuration Progress

Throughout the configuration process, the window will indicate:

1. The step currently being executed
2. The overall progress of the configuration process
3. All steps executed so far

Programming your radio for home use

Configuration completed

Once the configuration is complete:

1. Press "OK" on the dialog window
2. Press "OK" on the main window to return to the settings screen

Programming your radio for home use

Configuration errors

If an error occurs during the configuration process, follow the instructions in the error message to correct the problem.