WFS-46 4-Way Universal Switch Controller

Operating Manual

This document is online at http://www.wifitrax.com/manuals/WFS-46/WFS-46-Manual.pdf.

Please see our website for information on our limited warranty.

WifiTrax Model Science

www.wifitrax.com

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Version History

Version	Changes
1.0	Initial Release

Applicable Firmware Version

This manual applies to WFS-46 Firmware Versions 2.0.4 or later.

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What does WFS-46 4-Way Universal Switch Controller do?

The WFS-46 allows you to control four switch machines. These can be either twin coil types such as Atlas or Peco, or stall-motor switch machines such as the Tortoise series by Circuitron. You can set a given WFS-46 to control one or the other type but not both on the same module.

Twin-coil switch machines are further subdivided into those with three wire and those with two wire. The two wire types still have twin coils but have a diode to direct the current through one or the other coil according to the direction the current tries to flow. WFS-46 will accommodate both and you can wire a mix of these on the same module.

WFS-46 uses a capacitor discharge circuit to deliver a strong pulse of current and uses a voltage doubler circuit to charge the capacitor, and the voltage can be up to 24 volts using at least a 15-volt supply. This voltage can be set lower using DIP switches on the module. One of the DIP switches also controls whether twin-coil or stall-motor mode is selected.

- You can control switch machines using a smart phone, tablet or computer, provided it has Wi-Fi capability, using a web browser such as Apple Safari, Google Chrome or Microsoft Edge.
- You can use WifiTrax Tower Operator to build a schematic control panel that can include various kinds of switch such as right and left hand turnouts, Y switches and double slip switches implemented with the WFS-46 as well as lights, signals and power districts implemented with other WifiTrax modules.
- You can use a WifiTrax WFD-60 WiThrottle/DCC gateway to control switches connected to one or more WFS-46 using WiThrottle[1] on Apple, Engine Driver[2] on Android, or a special-purpose hand-held throttle such as TCS UWT-100[3] designed to control trains using the Hoffman WiThrottle Protocol[4]. The switches appear as a list within those apps and devices.
- Four hand-held devices at a time can join the WFS-46 Wi-Fi Access Point, but you can increase this limit using "home-net" mode as described later in this manual.

<u>You don't need to install JMRI to use the WFS-46</u>

The various control options are described in section "Operational Options for the WFS-46"
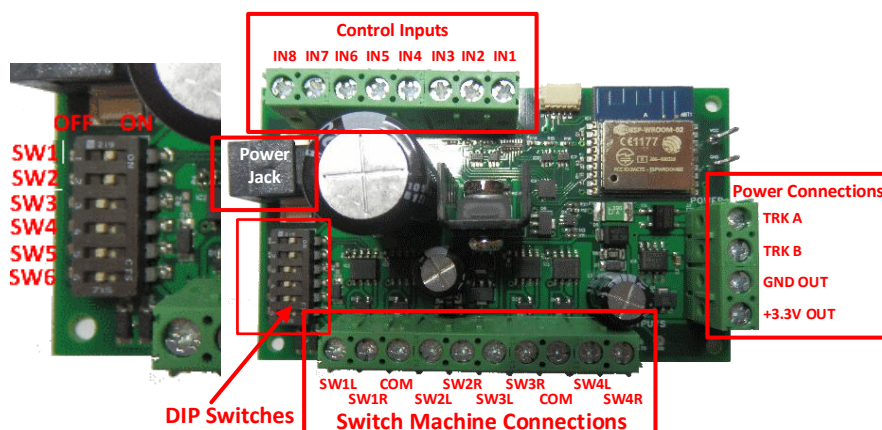
Figure 1 Connections and switches on the WFS-46

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[1] WiThrottle is an app running on Apple IOS written by Brett Hoffman. It is available as a free version (WiThrottle Lite) or a better moderately-priced paid version, both available on the Apple App Store.
[2] Engine Driver is an app running on Android, written by M. Steve Todd. It is available free on the Google Play Store.
[3] UWT-100 is a hand-held controller using the WiThrottle Protocol available from Train Control systems (TCS).
[4] WiThrottle Protocol is a network protocol invented by Brett Hoffman and used in WiThrottle, Engine Driver, JMRI and the TCS UWT-100. It has become a de-facto industry standard.

WFS-46 4-Way Universal Switch Controller Operating Manual

Figure 1 shows the WFS-46 module with its connectors labelled. There is a bank banks of screw connectors, labelled Switch Machine Connections in Figure 1, that each have four pairs of "live" outputs and two common connections. Each pair can be connected to switch machine and the common connections are shared between two machines. Each of these outputs are capable of driving about half an amp one at a time for some motor driven switch machines that have end switches. In twin coil mode, the pulse of current will be several amps as determined by the resistance and inductance of the switch machine coils.

The current pulse is easily enough to drive the more heavy-duty switch machines such as LGB and for most scales, more than one machine may be connected to the same set of terminals if it is required that they all operate together, such as for a cross-over track.

Power can be supplied via the screw terminals labelled Power in Figure 1 which may be connected with either polarity. A DCC signal may also be used, simply as a power source, but the unit is not designed to work with 50Hz AC. Alternatively power may be supplied through the Power Jack using a suitable Mains Adapter such as the PA15-43-1 Power Adapter 15V 4.3A available from WifiTrax. If you use a different mains adapter, it should have a Barrel Plug, 2.5mm I.D. x 5.5mm O.D. x 9.5mm, center positive and should provide between 12 and 18 volts DC.

A JST connector at the top right in Figure 1 allows firmware upgrade using the WifiTrax FWA-11 together with the WifiTrax Workshop application running on a Windows computer.

Let's get Started!

Connecting your new WFS-46 Cab Bus Wi-Fi Interface
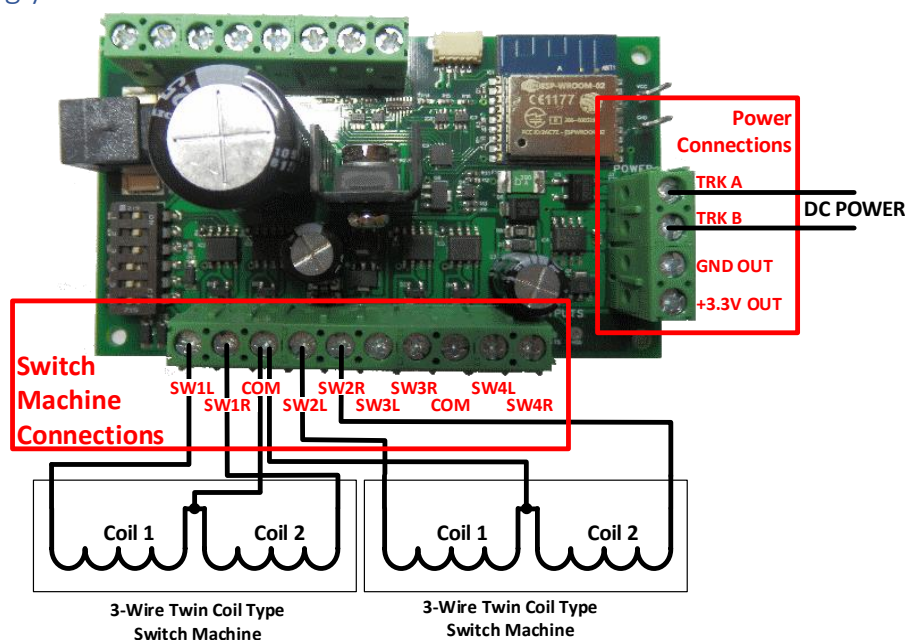
Figure 2 . Connection Diagram for 3-Wire Twin Coil Switch Machines
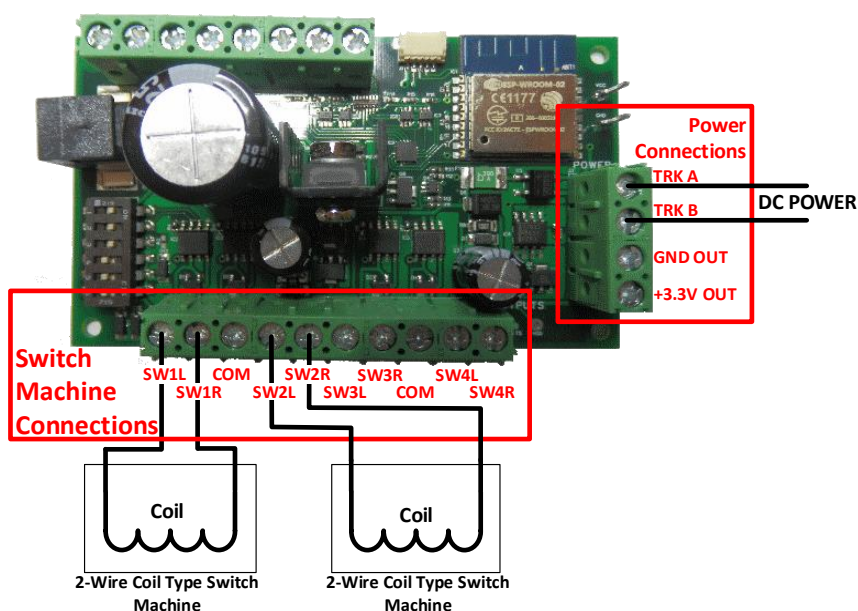
Figure 3 Connection Diagram for 2-Wire Coil-Type Switch Machines
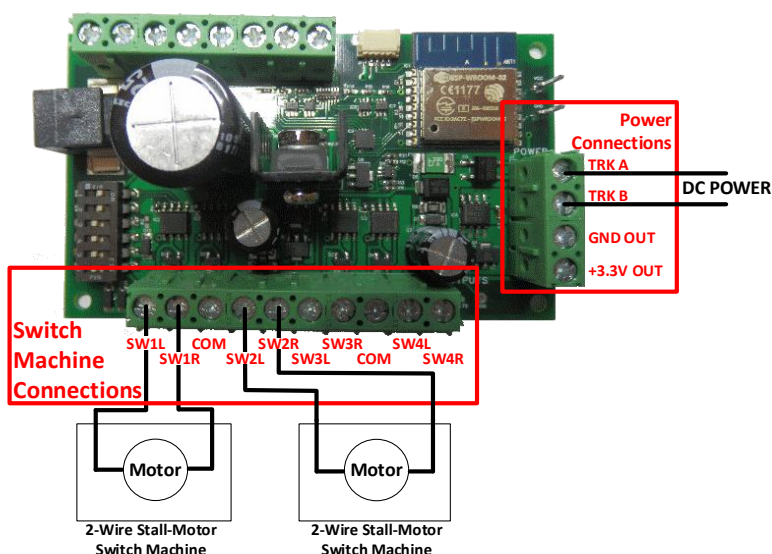
Figure 4 . Connection Diagram for Stall Motor Switch Machines

Connect your switch machines as in Figure 2 Figure 3 or Figure 4.

Set the DIP switches for the type of switch machine you are using according to Table 1 and Table 2.

Switch	ON Function	OFF Function	Remarks
SW1		Always set to ON	
SW2		Always Set to ON	
SW3	Twin Coil Mode	Stall Motor Mode	Mode Switch
SW4, SW5	See **Error! Reference source not found.**		
SW6			

Table 1 Link option settings

SW4	SW5	SW6	Output Voltage	
			SW3 = ON (Twin Coil Mode)	SW3 = OFF (Stall Motor Mode)
OFF	OFF	OFF	Up to 24V	Approx. Track Voltage – 3V
ON	OFF	OFF	19V	Approx. Track Voltage – 3V

OFF	ON	OFF	12V	12V
OFF	OFF	ON	9V	9V

Table 2 Voltage DIP Switch Settings

Connecting Manual Push-button Control
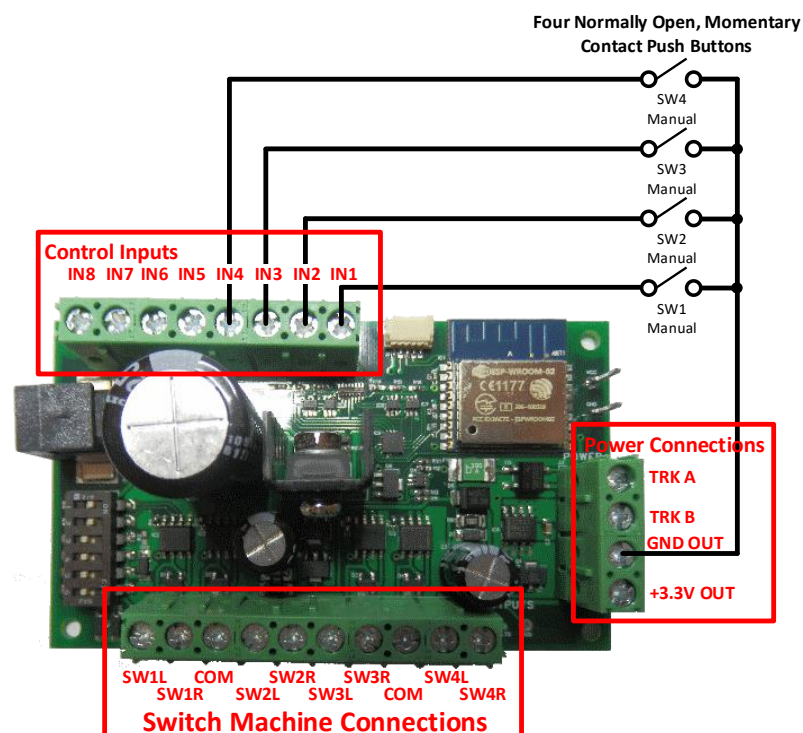
Figure 5 Connecting manual control push buttons

The WFS-46 allows for manual control of the switches connected to it using normally-open push button switches connected as in Figure 5. Be sure to connect the common line from the switches to the GND Out (Ground). Do not connect anything to the +3.3V OUT. This is included for possible feature expansion by firmware upgrade and is not currently used. In particular, **DO NOT CONNECT POWER ACCIDENTLY TO THE 3.3V OUT** as this will instantly destroy the module!

Installation Instructions

(1) First determine what kind of switch machines you wish to control. WFS-46 will control two basic types: Stall Motor and Twin Coil. Use Table 1 and Table 2 to set Twin-Coil or Stall-motor mode and also to set the voltage suitable for your switch machine.
You CANNOT mix stall-motor and twin-coil switch machines on the same module but you CAN mix2-wire and 3-wire twin coil switch machines.
You can also use one channel to control more than one switch, if these are always operated together.

(2) Wire the WFS-46 to your switch machines according to Figure 2, Figure 3 or Figure 4.

(3) Optionally connect manual push-buttons as in Figure 5.

(4) Make sure the DIP switches are set correctly.

(5) Connect power to your unit at TRKA and TRKB as shown in Figure 2 through Figure 4. It does not matter which way round you connect the power. You can also use DCC track power but NOT AC. The power should be between 12 and 18 volts. Alternatively use the Power Jack.
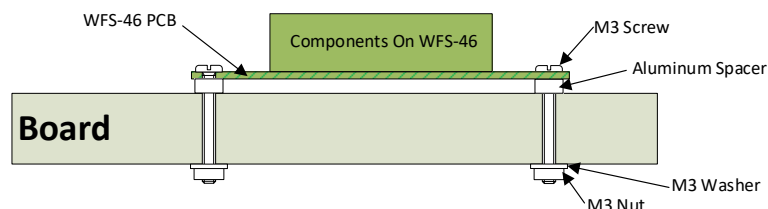
Figure 6 Mounting Suggestion

(6) Mount the unit using the four M3 metric screws, nuts and spacers provided. Mount the unit on a suitable piece of board, either your baseboard (top or bottom) or a separate board perhaps at the front of your model railroad. The component side of the module should face away from the board as in Figure 6. It is a good idea to mount it somewhere that is easily accessible. If you omit the spacers be sure not to tighten screws so that the unit bends. Take care that no part of the unit touches any metal as this may cause a short circuit and result in permanent damage. Do not mechanically stress or bend the module as this may cause damage. **Take care to ensure that there is adequate ventilation to avoid overheating**.

(7) **CHECK YOUR WIRING!** Turn on the power. You may test the unit using WFS-46 Web Pages described in the next section. Later you may decide to use the Tower Operator App or a WFD-60 Wi-Fi/DCC Gateway. Refer to the Tower Operator Quick Start, or Full Help Pages for instructions on setting up a schematic control panel on your Windows or Android computer or tablet.

Testing and Configuring your WFS-46

You can test and configure the WFS-46 using its web pages which are accessible from any browser on Apple IOS, Android or Windows. For example, you can use Apple Safari on an iPad, Google Chrome on an Android or Microsoft Edge on Windows.

Connecting using an Apple IOS Phone or Tablet

(1) Tap the Settings icon on your iPhone or iPad

(2) Tap Wi-Fi on the left-hand menu. Under Other Networks on the right, the list should include one like wftrx_WFS46_1_XXXXXXXX_7, where XXXXXXXX is the serial number of your unit that appears on its label. Tap that Wi-Fi Network and wait for a green check mark that shows it has connected. **You must always connect to this Network to access the WFS-46 web pages** unless you operate in home-net mode.

Connecting using Android

(1) Press the Home button and tap the Settings icon:

(2) Tap Connections, then Wi-Fi and select the module's wftrx_WFS46_1_XXXXXXXX_7 network as above. Wait for it to show that it has connected.

Connecting using Windows

On your Windows 10 desktop or laptop, click the networks icon in the system tray and select the module's network wftrx_WFS46_1_XXXXXXXX_7 as described above.

Testing using the WFS-46 Web pages

(1) Once you are connected to the module's network, open a browser such as Safari, Chrome or Edge and type the following in the URL bar followed by the Enter or Go key:
192.168.7.1

See Figure 7 which shows the IP Address 192.168.7.1 entered into the author's Edge browser running on Windows 10. This is the IP Address of the WFS-46 web pages when you are connected directly to its wftrx_WFS46_1_XXXXXXXX_7 network. When operating like this, the WFS-46 controls all addresses on its own little network. The IP address is the "raw" address of a website. Usually, people do not type an IP address into a browser but browsers do support this. Remember You will not be able to access these pages until you are connected to the module's wftrx_WFS46_1_XXXXXXXX_7 network.
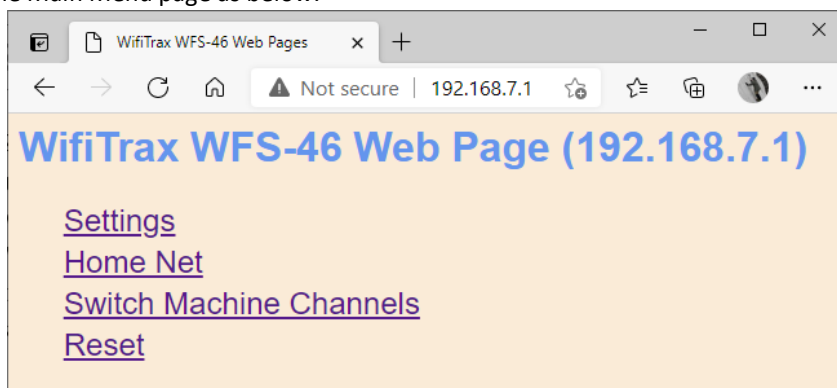
(2) You will see the Main Menu page as below:

Figure 7 WFS-46 Web Pages - Main Menu

(3) To test the switch machine channels, click or tap the Switch Machine Channels option. You will see the screen in Figure 8. The names of each channel default to the serial number plus the channel number as shown. You can change these names later.
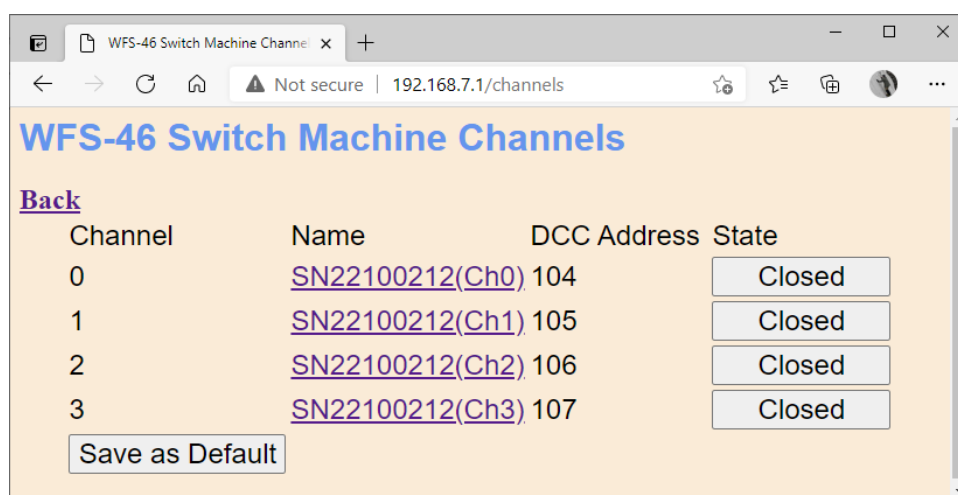
Figure 8 WFS-46 Web Pages – Switch Machine Channel List

(4) Assuming your switch machines are connected properly, tapping the button in the State column will toggle the switch between thrown and closed.
(5) You can also click on each entry in the switch machine channels list to edit the names and DCC addresses. DCC addresses are relevant if you use the WFD-60 WiThrottle/DCC gateway so your switches can appear as accessories on your DCC system.

For full information on the WFS-46 Web Pages see the section "The WFS-46 Web Pages in Detail".

Operational Options for the WFS-46

This section describes the options available for operating WFS-46 on your layout, that is to say, how can you throw or close switches during normal running of trains.

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Some Background

The WFS-46 can be controlled in two ways (1) through its Web Pages and (2) through its WifiTrax JSON interface. The JSON interface consist of a defined set of messages that can be sent to the module from the outside via its Wi-Fi network, using the HTTP protocol, to control it and obtain information from it. All WifiTrax modules support a JSON interface with messages that are specific to the particular module. We do not need to go into any more details about this interface except to say that it is only used between WifiTrax modules and between WifiTrax apps and modules.

Many WifiTrax modules also support the WiThrottle Protocol which is a protocol invented by Brett Hoffman for use with his WiThrottle app running on Apple IOS. It has become a de-facto industry standard and is used by Java Model Railroad Interface (JMRI) to allow Wi-Fi throttles to control locos and accessories via JMRI. Examples of such throttles are WiThrottle (by Brett Hoffman running on Apple IOS), Engine Driver (by Steve Todd, running on Android) and TCS UWT-100 a dedicated hand-held Wi-Fi throttle. All of these can work with JMRI, but several companies, including WifiTrax have built servers within modules that can be put in the place of JMRI and support the same set of throttles. Examples are WifiTrax WFD-30 and WFD-31 and Digitrax LNWI.

WFS-46 does not support the WiThrottle Protocol directly since it cannot control locomotives and probably no one would want to use a throttle to control switches and nothing else.

So, what ARE the options? Figure 9 shows all the options and interfaces. The next sections explain each option in detail.
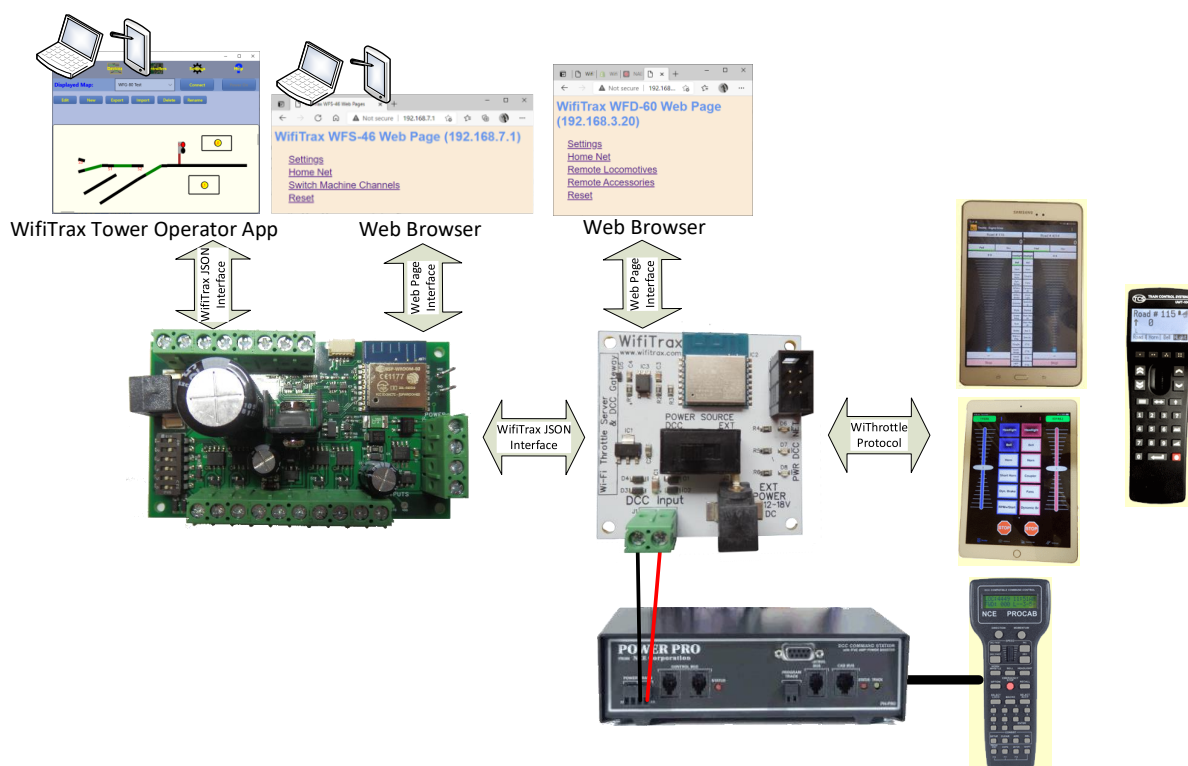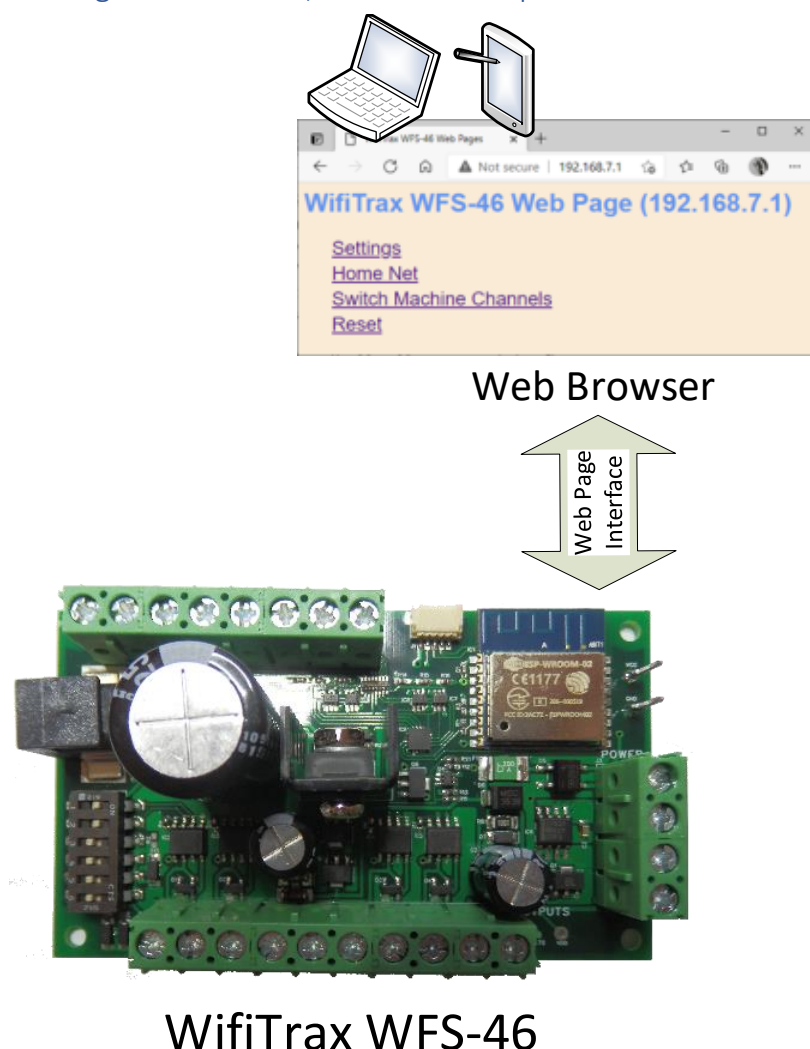

Figure 9 Options for control of switch machines using the WFS-46

Use WFS-46 Web Pages on a Phone, Tablet or Computer

Web Browser

WifiTrax WFS-46

Figure 10 Control of WFS-46 using only its Web Pages

Figure 10 shows this simplest method of operation which is to simply connect a phone, tablet or computer to the WFS-46's Wi-Fi network wftrx_WFS46_1_XXXXXXXX_7 as described in the section "Testing using the WFS-46 Web pages", open a browser at the IP Address 192.168.7.1 and use the web pages described in section "The WFS-46 Web Pages in Detail" to do all of the control you need.

This is OK if your tablet or computer does not need to do anything else on your layout. The problem is that once it is connected to that network, it cannot be connected to anything else, so you cannot use the same tablet/phone/computer to drive a locomotive using, say, the WFD-30 or WDMI-32, or indeed to connect to JMRI. If you have some old phones around, you could dedicate one for this purpose.

However, a much better way of using the web pages for WFS-46 control is to set the WFS-46 into home-net mode. The way to do that is described in the section "Home Net Page". Once in home-net mode, the WFS-46 connects to your home Wi-Fi router as soon as it powers up and you can communicate with its web pages and do other things on your home network as well such as control locos. Using later versions of Android, you can use split screen with the browser in half of the screen and a driving app such as Engine Driver in the other half.

What if you have more than one WFS-46? Well, all browsers allow multiple tabs, so you can connect one tab to each WFS-46. If you have other Wi-Fi Layout modules such as WFG-80 or WFS-86, you can have a tab dedicated to those as well.

So, this is a simple way of controlling lights, turnouts and trains. There is a complication in that you do need to know the IP address that your router assigns to each WifiTrax module. Once you know these you can add the web pages for each module to your browser favourites and give them names. A further issue is that the router might not always assign the same address to a module, but on most routers, you can avoid this by reserving IP addresses for each module. Please see the section "Reserving a Fixed IP Address" later in this manual.

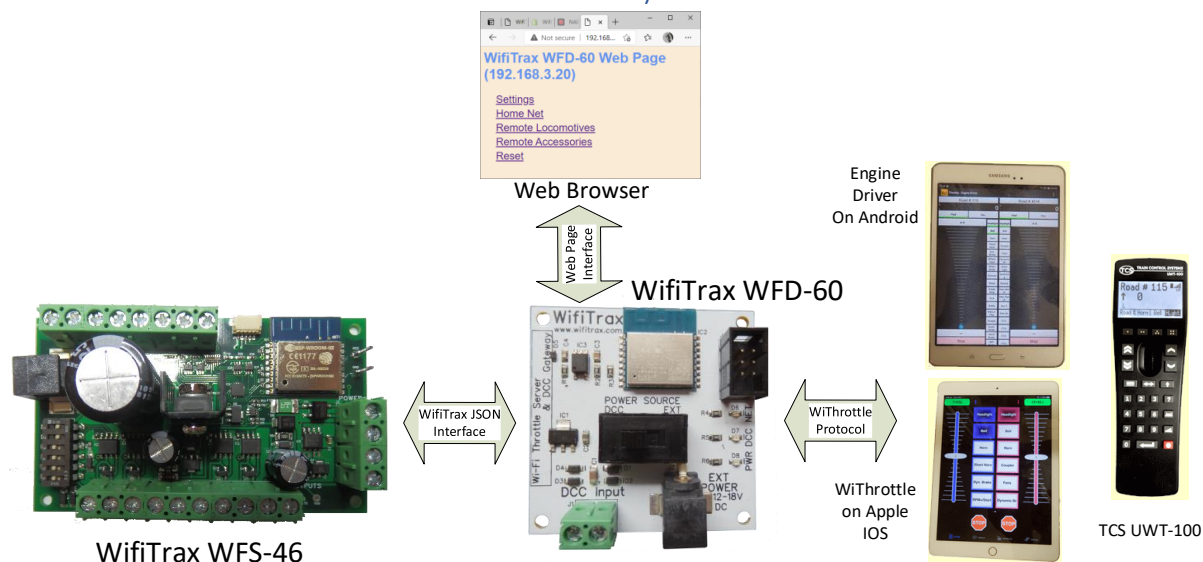## Use WFD-60 as a WiThrottle Protocol Gateway

Figure 11 Controlling the WFS-46 via a WFD-60 and WiThrottle Protocol Devices

You can get much more versatile if you use the WFD-60 as in Figure 11. The WifiTrax WFD-60 acts as a WiThrottle Protocol Gateway. This means that once you place it on your home net, it scans a specified range of IP addresses on your home net looking for WifiTrax Modules such as WFS-46 (or other modules). Once it finds one, it determines the channels on it and exposes them as either locomotives or accessories on a WiThrottle Protocol device connected to it.

You control the WFD-60 using its own Web Pages accessible either via a browser or through the Engine Driver or WiThrottle (paid version) apps.

As an example, if you have two WFS-46s on your home net and a WFD-60, the WFD-60 will find the WFS-46 modules and determine that each has 4 channels. When a WiThrottle Protocol device connects to it, such as WiThrottle running on an iPad, it will provide the set of accessories to the WiThrottle app on the iPad using the WiThrottle Protocol. This works with Android Engine Driver, Apple WiThrottle and TCS UWT-100.

With this option then, everything is available through one WiThrottle Protocol Server (the WFD-60) and up to six throttles can connect to it controlling switches and driving trains.
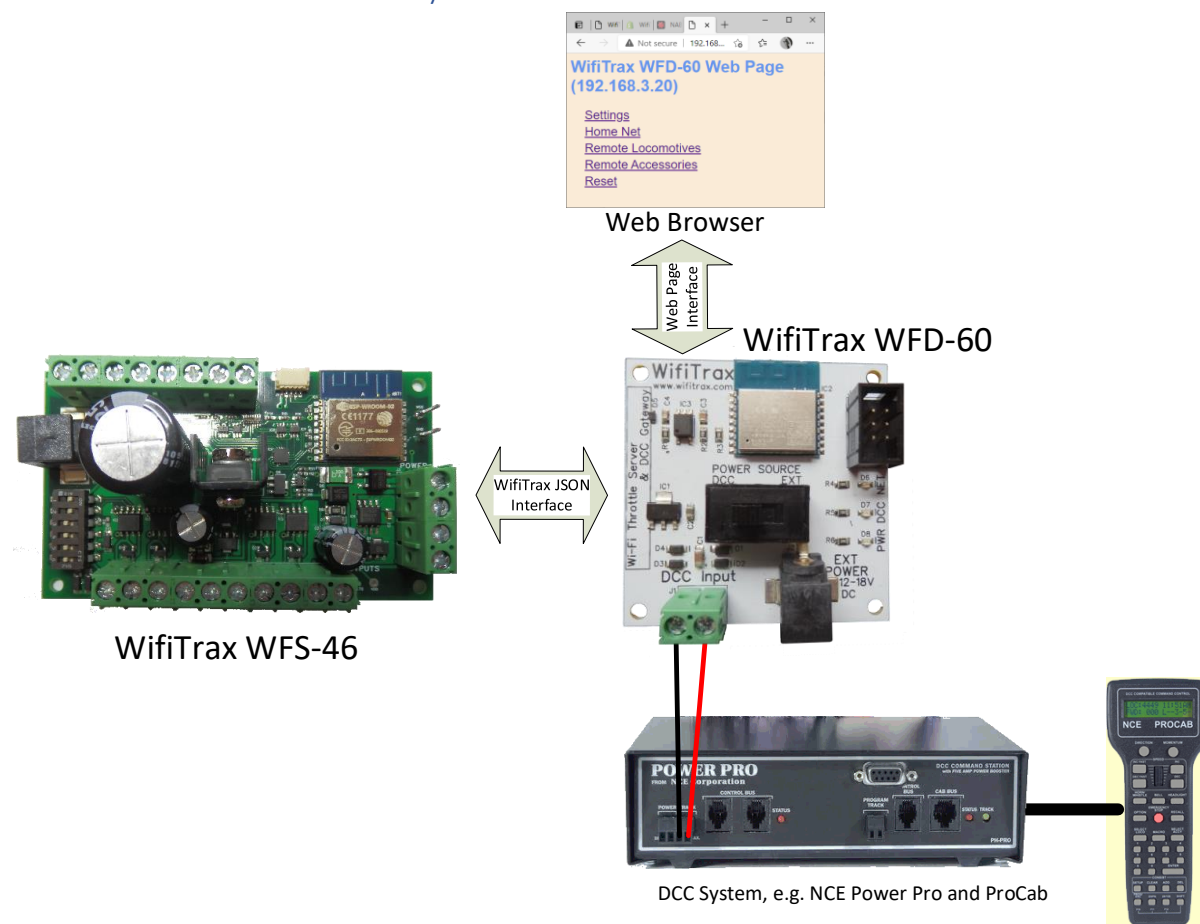
Use WFD-60 as a DCC Gateway

Figure 12 Controlling the WFS-46 using DCC such as an NCE Command Station/Booster

The WifiTrax WFD-60 is also a DCC gateway in that it contains a DCC decoder that responds to any DCC addresses found during the scan of the home net. Figure 12 shows this configuration.

For example, the WFS-46 implements 4 switch machine control channels, each of which can be assigned a DCC accessory address. As far as the module itself is concerned, this is not very relevant since the WFS-46 does not contain a DCC decoder. However, when a WFD-60 finds it, the WFD-60 DCC gateway acts as a proxy and decodes the DCC message, converts it into a WifiTrax JSON Interface message and sends it to the WFD-60. Thus, one can use any DCC command station connected to the WFD-60 to control the channels on the WFS-46 as accessories.

If more than one WFS-46 exist on the home net, their channels must all have unique DCC addresses assigned. Similarly, if you add other modules such as WFG-80 or WFS-86, all channels on all modules must have unique DCC addresses.

Taking this further, it is now possible to use a system such as JMRI through any supported DCC command station, connected to a WFD-60 to control switch machines using WFS-46 or lights using the WFG-80 or indeed locomotives using the WDMI Wi-Fi/DCC series or the WMR-10/WMH-20 Wifi Loco modules.

Use the Tower Operator App on Windows or Android

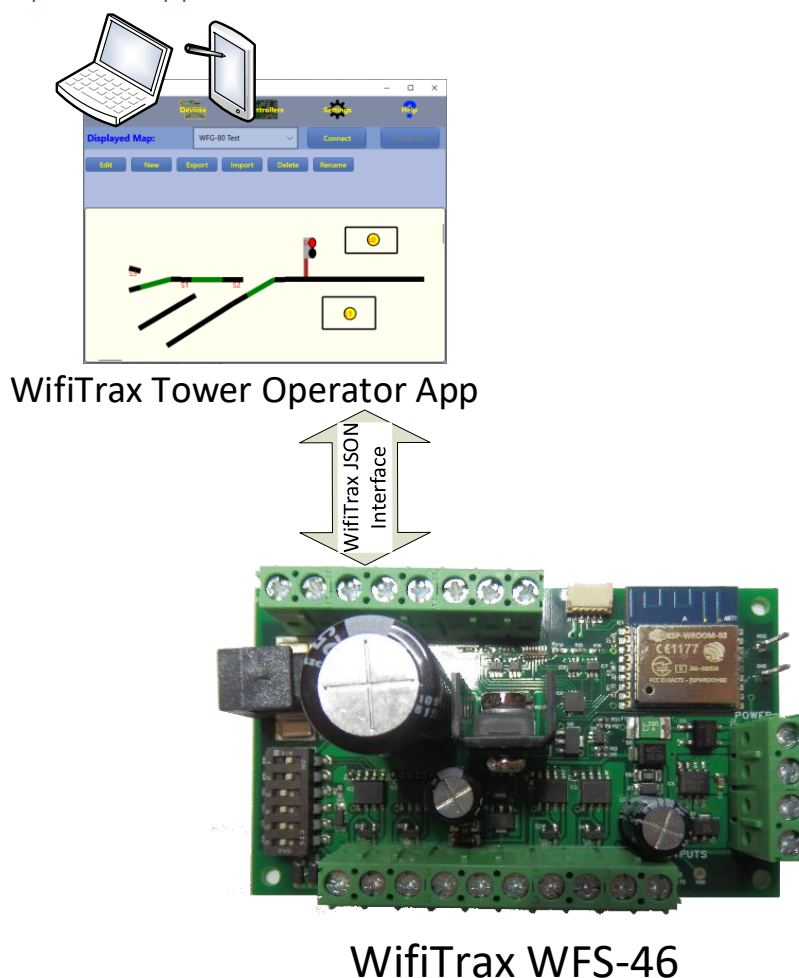WifiTrax Tower Operator App

WifiTrax JSON Interface

WifiTrax WFS-46

Figure 13 Using the WifiTrax Tower Operator App to control WFS-46 with turnouts and a Y switch

Tower Operator is a complex app, developed by WifiTrax and available free, that runs on Windows 10 or Android. This app allows you to scan your home network for controllers such as WFS-46. You can then use it to create logical devices such as various kinds of switches whose control points are mapped to channels on the WFS-46 controller.

For example, you could create two turnouts and a double slip switch. Then you would assign each turnout to one channel on a WFS-46 and the two control points on the double slip switch to the two remaining channels.

Having done this, you can create a map (schematic control panel), such as appears in dispatcher's train control panels, and add the switches to it, together with a track plan. Tower Operator supports several WifiTrax modules so you can create lights, signals and power districts as well and represent them on your map.

The WFS-46 Web Pages in Detail

The WFS-46 web pages allow configuration and control of the module including overall settings, home net, and switch machine channels. Please remember that these web pages are entirely generated within the module itself and so no internet access is needed to access them.

When the module is not in home net mode, i.e., as it is shipped or after a factory reset, the web pages can be accessed by first connecting a computer or tablet to its Wi-Fi network wftrx_WFS46_1_XXXXXXXX_7 (where

XXXXXXXX is the module's serial number), then using any browser (Chrome, Safari, Edge, etc.) to access the URL 192.168.7.1. In this case the URL typed into the browser is just the IP address of the module on its own network.

When the module has been placed on a home net, the IP address will be assigned by the router and you will need to type that IP address into the browser. See the section "Home Net IP Address Assignment".

Main Menu Page

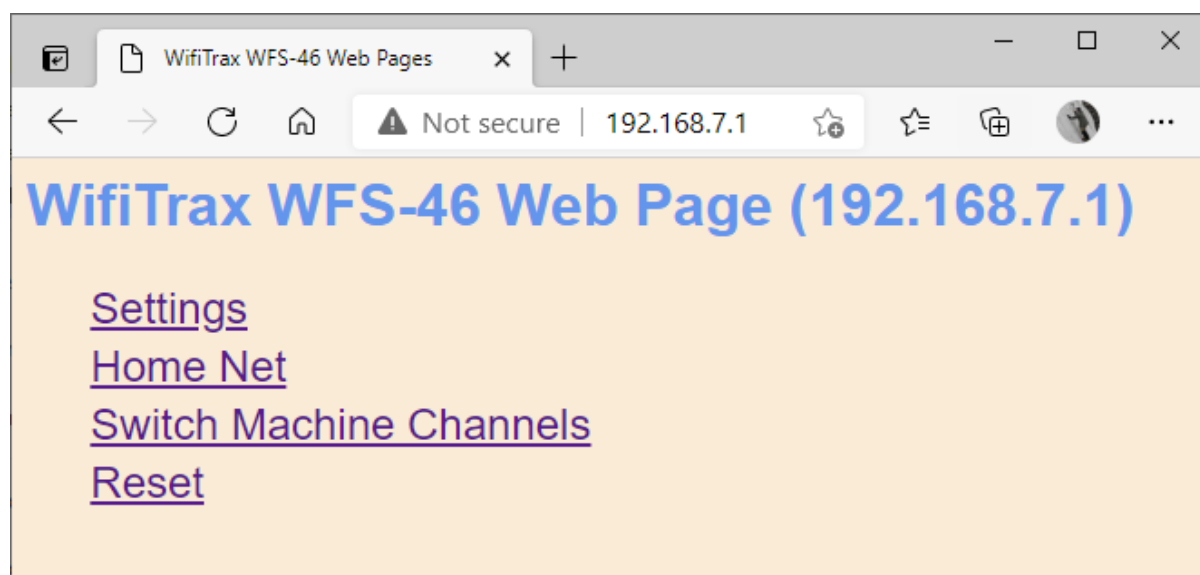When you access the address described above, you will be taken to the Main Menu web page as shown in Figure 14.

Figure 14 WFS-46 Main Menu page

Settings Page

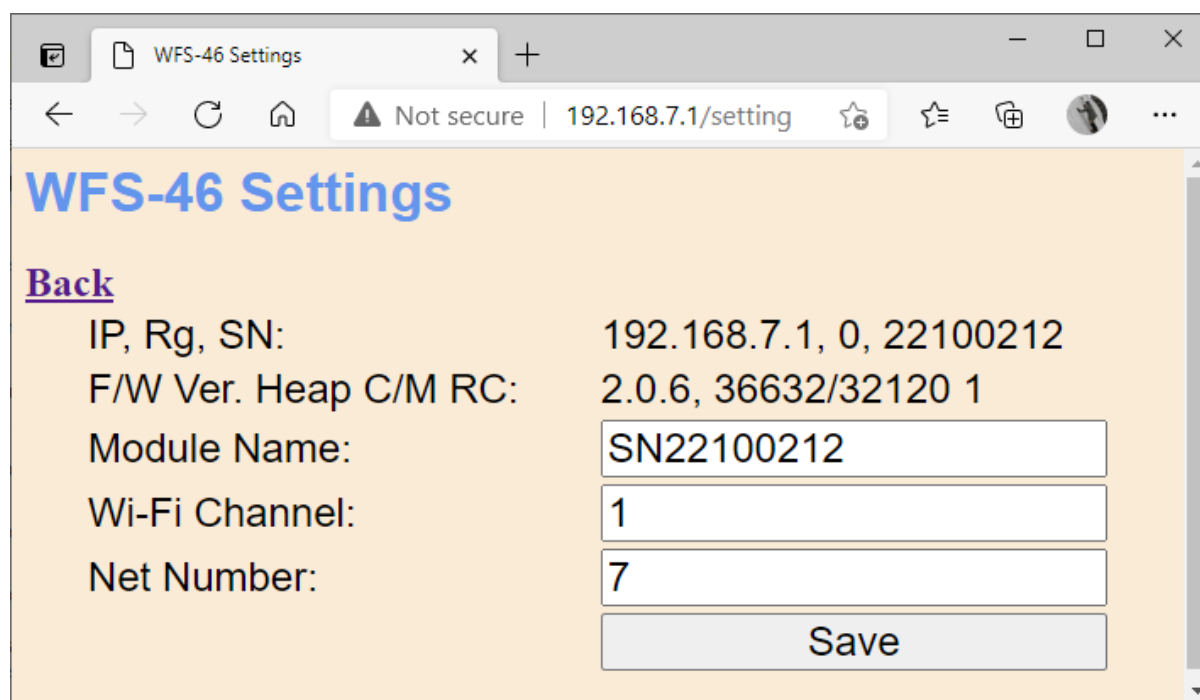Access the Settings Page by tapping or clicking the Settings menu item on the Main Menu page.

Figure 15 WFS-46 Settings page

The Settings page in Figure 15 has some lines of information and some items that can be changed.

The first line shows the current IP address of the module and in the example, it is the address that it always takes on its own network. On the same line is the region code, either 1 for North America or 0 for the rest of the world. Following this, on the same line is the serial number.

The second line shows the firmware version followed by some debug information relating to something called the "heap" formatted as: (Current heap space)/(Minimum recorded heap space). Lastly on the second line is the number of restarts since a factory reset.

The third line shows the current name of the module which defaults to SN followed by the serial number. You may change this to anything up to 10 characters without spaces.

The next line shows the Wi-Fi channel, defaulted to channel 1 on the 2.4GHz band. You can change this to a value from 1 to 11 in North America or 1 to 13 in the rest of the world. This channel is only applicable when the module is NOT in home-net mode. In home-net mode, the Wi-Fi channel is determined by the router.
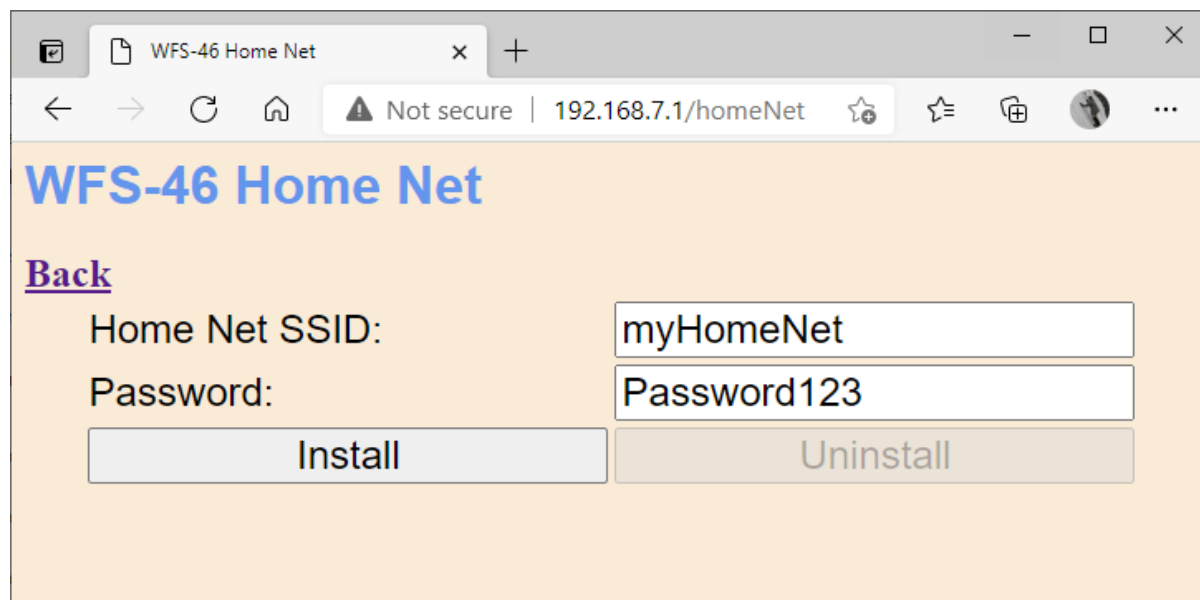
Lastly, there is an option to change the Net Number which defaults to 7. This is the number that appears in the IP address as the third number, e.g., 192.168.NN.1, where NN is the net number. Again, this is only applicable when the module is NOT in home-net mode since in home-net mode the IP address is assigned by the router.

When any of these are changed, it is necessary to click on the Save button. If any of the settings are invalid, none will be accepted. If all the settings are valid, they will be saved in Flash memory permanently. A factory reset will restore default values.

Wi-Fi changes will not have any effect until the power is cycled.

Home Net Page

The Home Met page in Figure 16 is accessed by tapping or clicking the Home Net item in the Main Menu page.

Figure 16 WFS-46 Home Net page

The Home Net page is used to place the module on your Home Wi-Fi Network. Once this is done, you can access the module without connecting to its own network, indeed its own network will no longer be advertised. Once in home-net mode, each time on power-up, the module will attempt to connect to the specified home network. After a certain period of time, if it fails, it will revert to its original (direct i.e., non-home-net) mode and begin advertising its own wftrx_WFS46_1_XXXXXXXX_7 network again. Thus, if your home network is not accessible, you can always go back to accessing it in direct mode.

To set the module into home-net mode you need your home network's SSID and password, which must be entered on this page, as in the example followed by clicking the Install button. You can usually find your SSID and password on a card supplied by your internet service provider. Or, of course, you may have changed it.

When the module goes into home-net mode it will restart and you will lose access to these web pages. To display them again, use the IP address assigned by your router, see section "Home Net IP Address Assignment".

When the module is in home-net mode, you can also use this page to remove it from the home net and go back to direct mode. The module will restart and you will lose access to these web pages. To display them again use the IP address 192.168.7.1.

You can leave the Home Net page without changing anything by clicking Back.

Switch Machine Channels Page

Access the Switch Machine Channels Page by tapping or clicking the Switch Machine Channels menu item on the Main Menu page.
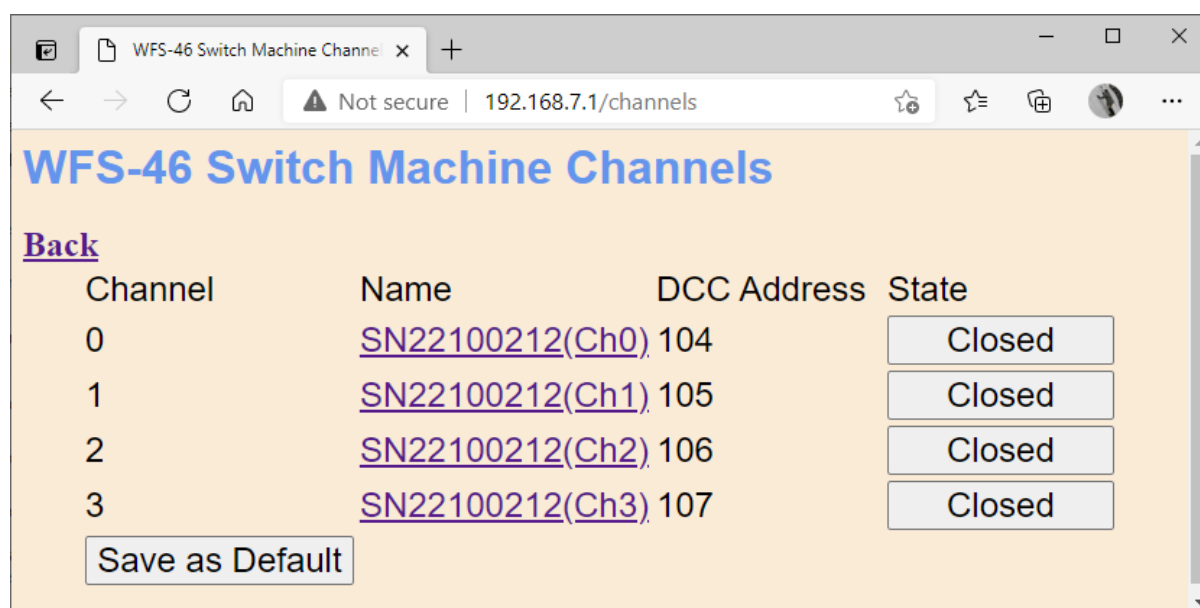

Figure 17 WFS-46 Switch Machine Channels page

This page, shown in Figure 17 lists all of the output channels of WFS-46 used to drive switch machines. Each channel has a number from zero to three, a name, a DCC address and a state column showing the channels current state. The name and DCC address will be supplied to any WFD-60 gateway module that discovers the WFS-46 module on the home net. The DCC address will determine the accessory address for which a WFD-60 will accept a DCC Accessory Command on its DCC bus input.

The buttons in the right-hand column under the State heading can be used to toggle the output of that channel between on and off.

The Save as Default button will cause the current states of all the channels to be saved into flash memory to define the power-on default state.

Clicking or tapping on the hyperlinks for a given row in the Name column will open an edit page for the channel represented by that row.

Click the Back hyperlink to return to the Main Menu page.

WFS-46 Switch Machine Channel Edit Page

This page, shown in Figure 18 allows editing of the name, DCC address and Reversed state for one of the switch machine channels. Click Save to cause the new values to take effect.

The name can be up to 31 characters long.

The DCC address can be up to 9999.

The reversed checkbox, when checked means that thrown and closed will be reversed for that switch machine channel.
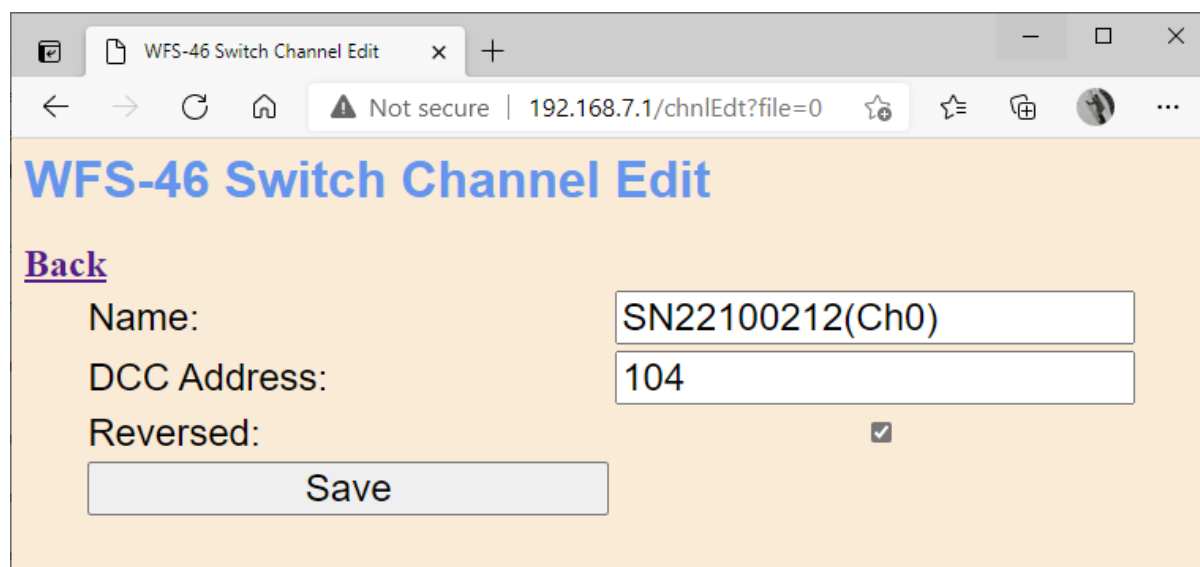
If any entry is invalid, none will be saved.

Figure 18 WFS-46 Switch Machine Channel Edit page

Reset Page

The Reset page is entered by clicking Reset on the Main Menu. Clicking Continue will reset the module to its factory configuration. This includes removing any home-net settings. Any renaming or changing of DCC channels will be lost. To return to the Main Menu without resetting, click the Cancel hyperlink.

Figure 19 The Factory Reset page

Tips to Manage your Home Network

Connection to your Home Router

When you set a WFS-46 module to Home-net mode, it will immediately restart and try to connect to the Wi-Fi Access point that you specified in the SSID, using the password that you supplied. From then on, it will try to connect each time you power on. If the connection is unsuccessful, it will give up after about 30 seconds and revert back to Direct mode to allow you to connect and either correct the problem or return it to Direct mode. Usually, failure to connect occurs because the password or SSID is incorrect, so you would need to double check that, but it might be because your home router is too far away or is turned off.
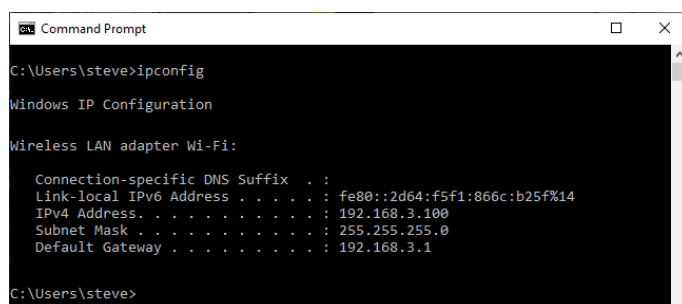
Sometimes routers refuse connections because of some internal hang-up problem and need to be restarted from time to time. Also, occasionally there are so many people operating Wi-Fi devices in an area that there is just too much radio traffic. In this case changing the router to a different channel may work. Remember that in Home-net mode, the WFS-46 always uses the Wi-Fi channel of the router that it is connected to, so changing the channel only affects direct mode. To change channel in home-net mode, you need to change the channel of your router.

Home Net IP Address Assignment

Every device connected to a network needs an IP Address and when your WFS-46 successfully connects to your home router, the router will allocate it an IP Address from a list of unused addresses. This process is called DHCP (Dynamic Host Control Protocol) and you can Google the term to find all the information you would like. IP Addresses are leased to connected devices and it is possible that the next time you turn on your WFS-46, the lease will have expired and the router will give it a different IP Address. This is particularly likely if your WFS-46 has been off for a long time and other devices have connected to the router, or the router has been restarted.

To access your WFS-46 from a browser such as Internet Explorer, Edge, Chrome or Safari, you need to know its IP Address. Probably the best way is to visit the Admin page of your router.

(1) To do this, type the address of your gateway into a browser. You can find the gateway address by opening a Windows command console and typing the ipconfig command:

Figure 20 Using ipconfig to find your computer's IP address and default gateway

(2) Figure 20 shows the result. Now take the default gateway IP Address, 192.168.3.1 in this example, and type it into the address bar of your favorite browser, then hit the Enter key.
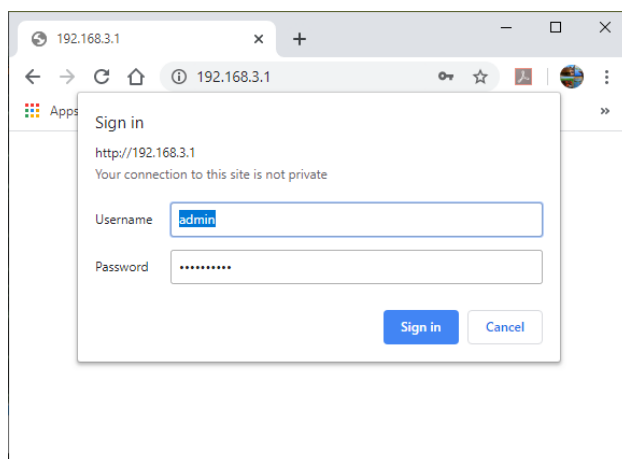
Figure 21 Access your router by using the IP Address of your default gateway in a browser

(3) The browser will ask for your user-name and password to access your router's admin page. You can find this in one of these places, unless you have changed it:
- a. A sticker on your router, at the back or underneath. Look for the Admin user name and password (this is not always the same as your Wi-Fi password),
- b. On a card supplied by your internet service provider or telco,
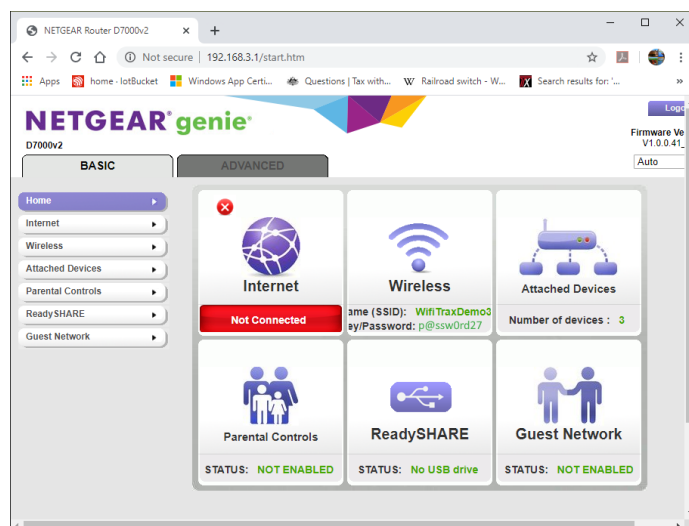- c. In the leaflet that came with your router.

Figure 22 A typical router admin page

(4) Once you have given the credentials, you will see the admin page. A typical one is shown for a Netgear D7000 in Figure 22. Find the "Attached Devices" option and click on it.

Figure 23 Typical "Attached Devices" page of a router

(5)   You will see a screen something like Figure 23. Find the row where the MAC address matches that printed on the bag label of your WFS-46 device. Here the MAC Address `DC:4F:22:39:EA:C0` matches the STA MAC Address on the bag label, so the IP Address that was assigned by the router is `192.168.3.9`

(6)   Now open another tab in your browser and type the IP Address, `192.168.3.9` in this case， into the address bar to get the main menu web page of your WFS-46. You can save this in your browser favourites to make it easier to access next time.
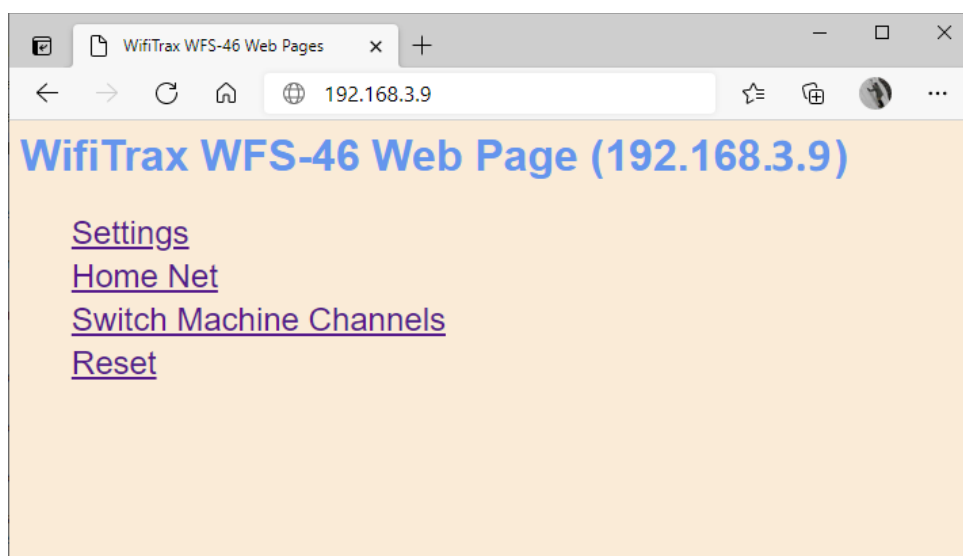

Figure 24 Use the IP Address to open the main menu web page

Reserving a Fixed IP Address

That's all well and good but earlier it was said that routers do not always assign the same IP Address!

Figure 25 An IP Address reservation table in a router

Well, while you're in the router admin page you can *reserve a fixed IP Address* for your WFS-46 module. In the Netgear D7000v2 that is used here as an example, you need to click the Advanced tab, then the Setup menu and the LAN Setup sub-menu. The table at the bottom of Figure 1 shows the Address Reservation Table. In this router, you can see that there are already 5 reservations and to add a new one, we hit the Add button.

Then type in the IP Address and MAC Address from Figure 23, give the reservation a device name something like "WFS-46-1" and hit Add as Figure 26.

Figure 26 Adding an address reservation

Usually, you have to click the Apply button to restart the router, then check the reservation page to make sure the new one is there. Now your module will always have the same IP Address when it connects to the router after cycling power.

More Information

Tower Operator Detailed Help Pages:

http://www.wifitrax.com/help/toweroperator/help.html

http://www.wifitrax.com/help/towerOperator/help.html

WifiTrax Model Science
www.wifitrax.com

Article about Wi-Fi/DCC:

http://www.wifitrax.com/appNotes/WiFi-DCC.pdf

Access all the articles:

http://www.wifitrax.com/appNotes/howToArticles.html

FCC Information

Radio or TV Interference (this information is MANDATED by the FCC)

This equipment incorporates Espressif Wi-Fi Transceiver Module ESP-WROOM-02D.

 FCC Identifier: 2AC7Z-ESPWROOM02D.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and the receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help. **Note that any modifications to the equipment not expressly approved by WifiTrax voids the user's authority to operate under and be in compliance with CFR 47 rules**, as administered by the Federal Communication Commission. WifiTrax believes any conscientiously installed equipment following guidelines in this manual would be unlikely to experience RFI problems.

For Canadian Users: "This digital apparatus does not exceed the Class B limits for Radio noise emission from digital apparatus set out in the Radio Interference Regulation or the Canadian Department of Communications." Le present appariel numerique n emet pas de bruits radio-electriques depassant les limites applicables aux appareils numeriques de la classe B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

EU Declaration of Conformity

1. Radio equipment: WifiTrax Model WFS-46 4-Way Universal Switch Controller Module

2. Name and address of the manufacturer or his authorised representative:

> WifiTrax Model Science (A business owned by Steve Shrimpton Sciences Pty. Ltd. a company registered with the Australian Securities and Investments Commission ACN: 076 070 258)

> 116 The Gully Road, Berowra NSW 2081 Australia

3. This declaration of conformity is issued under the sole responsibility of the manufacturer.

4. Object of the declaration:

> WifiTrax Model WFS-46 4-Way Universal Switch Controller as pictured in Figure 27 and identified by a label on the module bearing the model number WFS-46.
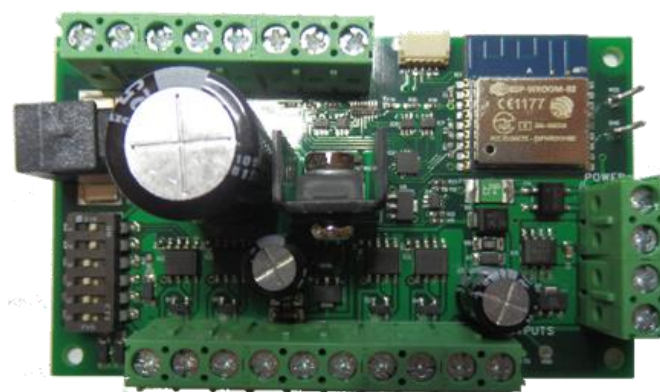

Figure 27 Identifying Illustration for WifiTrax Model WFS-46 EU Declaration of Conformity

5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation: Directive 2014/53/EU

6. Description of accessories and components, including software, which allow the radio equipment to operate as intended and covered by the EU declaration of conformity:

> ESP-WROOM-02D Wi-Fi Internet of Things Module, Espressif Systems (Shanghai) Co., Ltd.

> EU-type Examination (Module B) Certificate No. 192140277/AA/00

> Issued by Telefication BV The Netherlands, Chamber of Commerce 51565536, www.telefication.com

7. Additional information:

> Manufacturer has undertaken engineering analysis and appropriate testing to determine the subject of this declaration performs in its electromagnetic characteristics in the manner specified for the radio module identified in item 6 above.

> Module is configured for EU market to allow Wi-Fi Channels 1 through 13 in the 2.4GHz Wi-Fi band.

Signed for and on behalf of: WifiTrax Model Science March 19, 2021, Berowra NSW Australia

Stephen J Shrimpton, Chief Engineer, Director