WFD-60 Wi-Fi/DCC Interface Module

Operating Manual

This document is online at http://www.wifitrax.com/manuals/WFD-60/WFD-60-Manual.pdf.

Please see our website for information on our limited warranty.

WifiTrax Model Science

www.wifitrax.com

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This product is not a toy. Keep away from children. It is not suitable for use by persons under 14 years of age. Warning: This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Version History

Version	Changes
1.0	First Release, Version 2 Firmware
2.2	Updated for Version 2.2 Firmware
2.3	Updated for version 2.6 Firmware including Accessory Scanning, Track Occupation and other features.

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Scope of this Document

This document describes detailed use of the WFD-60 Wi-Fi/DCC Interface Module. For a simple starting guide, please see the leaflet at http://www.wifitrax.com/appNotes/quickStart/WFD-60-Quick-Start.pdf.

This manual applies to firmware version 2, i.e., version numbers 2.X.X. Some features described may not be present in early versions. This manual also describes features only in versions 2.2.X, these being indicated in the text.

What does WFD-60 DCC/Wi-Fi Gateway Do?

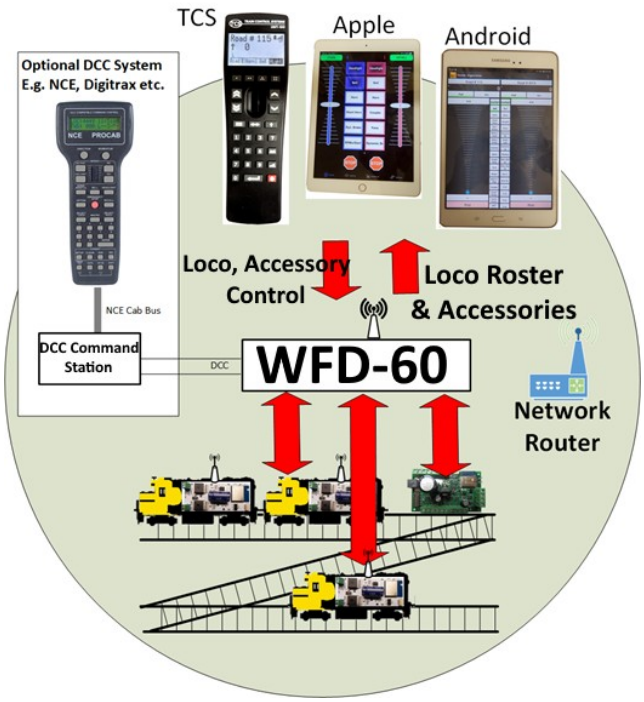


Figure 1 WFD-60 in Operation

The WFD-60 DCC/Wi-Fi Gateway provides three capabilities:

(1) Layout Controller. The WFD-60 scans your layout for Wifitrax modules such as Switch Machine Controllers, Lighting Controllers and Track Occupation Detectors. You can then use Web Pages that contain lists or layout maps to control and display the status of your layout layout including points, lights and track occupation. Use any browser to do this such as Edge on Windows, Safari on Apple IOS or Chrome on Android.

(2) Control of Locos and Points fitted with Wifitrax modules via a WiThrottle interface using apps such as Android Engine Driver and Apple IOS WiThrottle or the TCS UWT-100 or UWT-50.

(3) Control Locos and Points fitted with Wifitrax modules from any DCC system using the DCC input to the WFD-60.

The WFD-60 may be mounted on your layout to act as a WiThrottle Server. A WiThrottle Server allows you to connect using a phone or tablet with a suitable app using WiThrottle protocol such as Apple IOS WiThrottle and Android Engine Driver or the TCS UWT-100, and control trains on your layout that are fitted with WifiTrax Wi-Fi DCC interface modules such as WDMI-27, WDMI-32, WDMI-37 for locos and WFS-47 or WFS-87 for points.

WFD-60 provides a set of Web Pages that are internally generated that allow you to control points or other accessories as well as drive trains using the Web Pages of the modules in the locos. You do not need to be connected to the internet.

WFD-60 also provides a DCC input to which a DCC command station may be connected.

WFD-60 is thus a WiThrottle and DCC gateway as well as being a comprehensive browser-based layout controller.

- WFD-60 must connect to your home network and will scan to discover WifiTrax Modules e.g., WDMI-27, WDMI-32, WFS-47, WFS-87, WFU-85 etc. These will be added to its internal roster of locomotives and accessories. You can also add these manually and save them to your computer or tablet to be reloaded later.
- WFD-60 delivers this as a Loco Roster and Accessory List to connected WiThrottle devices – Android Engine Driver, Apple WiThrottle, TCS UWT-100. Select from these rosters to drive your train or operate your points.

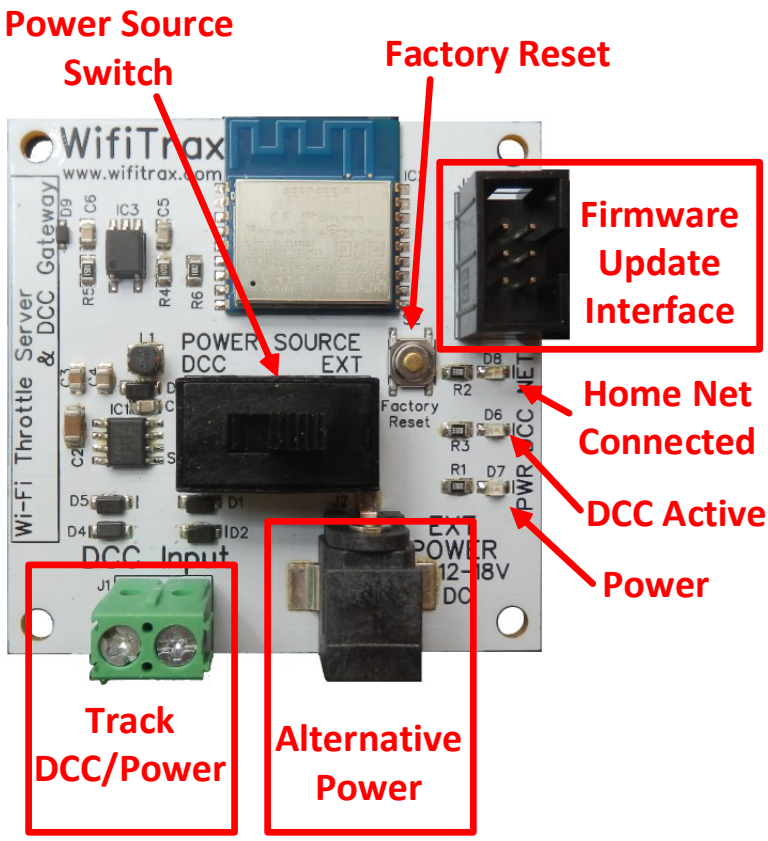


Figure 2 Connections and switches on the WFD-60

Figure 2 shows the WFD-60 module with its connectors labelled. There is a pair of screw connectors at the bottom left of the module, marked DCC Input. These can be optionally used to provide Bipolar DCC input to the module. DCC Commands appearing on this input will control locomotives and points that are included in the roster of the WFD-60. This input can optionally also be used as power for the module. The polarity does not matter.

The socket marked Alternative Power may be used to supply power to the module whether or not the DCC input is connected. Of course, if you do not use DCC input, power must be supplied at this connector.

The Power Source switch is used to select either the DCC input or Alternative Power input as the source of the module's power. This must be set correctly or the module will not work.

The 6-Pin connector at the top right is used for firmware update via a Wifitrax FWA-20 module and the Wifitrax Workshop software for Windows.

The Factory Reset button will reset the module to its factory default settings when pressed and held for 8-10 seconds. The green LED will flash rapidly when reset has been started. All loco and accessory roster entries will be lost as well as any home net settings.

The LEDs on the right are:

(1) Red LED - Power: Lights whenever power is applied to the module.
(2) Green LED – Network: Flashes when the module receives Wi-Fi Network Traffic. Lights continuously when the module is connected to a home network router and flashes briefly off when module receives traffic.
(3) Blue LED – DCC: Lights continuously when a valid DCC input is present at the module.

The WFD-60 uses the same protocol as JMRI but you don't need to install JMRI on any computer to use the WFD-60.

What is WiThrottle protocol?

WiThrottle protocol is a set of commands and data formats, authored by B. Hoffman and used by JMRI, that allows devices such as iPhone, Android phones and tablets to control trains and turnouts through a WiThrottle server. It has become something of a de-facto standard and is used by other products. You can find technical information here:

https://www.jmri.org/help/en/package/jmri/jmrit/withrottle/Protocol.shtml

What is JMRI?

JMRI (Java Model Railroad Interface) is a system of computer programs and support software that can be installed on a computer to do many things with your model railroad including running trains, controlling turnouts and programming DCC decoders. JMRI provides a WiThrottle server to allow you to run trains from phones etc. You can learn about JMRI here:

https://www.jmri.org/

Let's get Started!

A few Things to Know

Here are a few technical sounding terms that we're going to use repeatedly in this manual. They might sound clever but they are really very simple so let's bite the bullet and get used to them right away!

IP Address. This stands for *Internet Protocol Address*. We all use the internet and this is crucial. All it means, is the address given to any computer or other device on the internet. It's got four numbers, each 0 to 255. For example, 10.0.0.27, 192.168.15.5 and 59.48.123.5 are all IP Addresses. You'll see 192.168.(something).(something) a lot because it's defined as a private part of the internet, and the local network in your house is private.

Subnet. The internet has lots of networks all connected together by gateways. A subnet is a local group of computers or devices. A subnet almost always has the first three digits of an IP Address followed by a zero. So, 192.168.15.0 is a Subnet and 192.168.15.4 or 192.168.15.17 are IP Addresses in that subnet. It's like a street in your neighbourhood where each house has a number.

Router. A router is a box of electronics that joins two or more subnets and routes messages from one to the other. It's like the Post Office. It also allocates IP Addresses to computers and devices on the subnet it manages.

Wi-Fi Access Point. This is an electronic device that allows a device to access a subnet using Wi-Fi. Wi-Fi is a special form of Radio. Usually, a Router has a Wi-Fi Access Point. All Wifitrax modules also have their own Access Point. An Access Point is identified by an **SSID** and often requires a password. Sometimes routers have more than one SSID. **Wifitrax products can only use the 2.4GHz access point on a router and NOT the 5GHz or Guest Network access points.**

SSID. It stands for "Service Set Identifier" but it's just the name of a Wi-Fi Access Point.

That's it, now let's really get started!

Installing your new WFD-60 on Your Layout

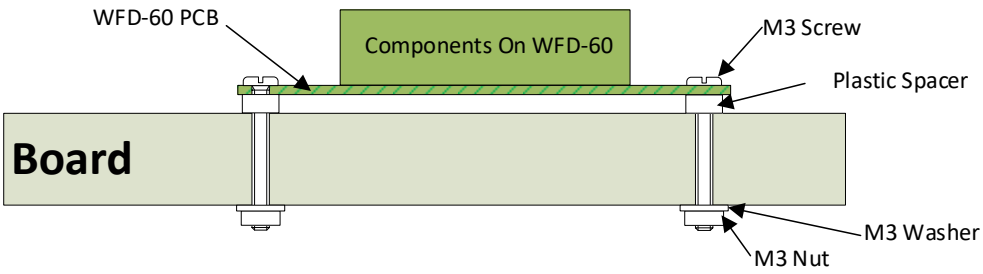


Figure 3 Mounting the WFD-60 on a Baseboard

Mount the WFD-60 module on a convenient board on your layout using the mounting kit provided. You may also mount it inside a suitable plastic box. Do not use a metal box as this will affect the Wi-Fi signal.

It is most important that the module never comes into contact with any metal objects or any power such as your track! The electronics uses 3.3 Volts provided by an on-board voltage stabilizer and contact with any higher voltages will destroy it.

You must use the WFD-60 with a Wi-Fi Router, so it is a good idea to place it near to the router if possible. The locomotives and points fitted with Wifitrax modules should also be as near as possible to your router. It may be best to get a simple router and place it in your railroad room if your house is large. The router does not need to be connected to the internet, though if it is, your phones and computers can access the internet while also running trains.

Connecting your WFD-60 to your First Loco

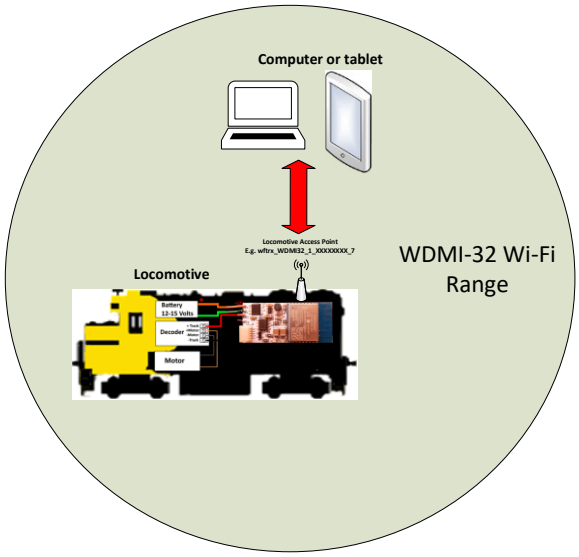


Figure 4 Direct Operation of a Locomotive Fitted with a Wi-Fi Interface Module such as WDMI-32 or WDMI-27

Let's assume that you already have a locomotive with a Wifitrax Wi-Fi Interface Module such as WDMI-32, WDMI-27 or WDMI-37 already installed and working, in Direct mode. If not, please consult the Getting Started Leaflet or manual for those modules. Figure 4 shows a computer, tablet or phone connected directly to the Wi-Fi Access Point of a loco fitted with a WDMI-32. The module's access point will be called wftrx_WDMI32_1_XXXXXXXX_7 where XXXXXXXX is the module's serial number. In this situation, you could be driving your locomotive using the Web Drive Page of the WDMI-32 using any browser, or you could be driving the locomotive using an app such as Engine Driver on Android or WiThrottle on Apple IOS, or indeed you could be using a TCS UWT-100.

Now that you've obtained a WFD-60, you want to connect your Engine Driver or WiThrottle apps as well as your UWT-100 to the WFD-60's WiThrottle Server and control your existing loco and any more locos that you might add (as well as any points) through that module. So, here's the procedure. We'll use the WDMI-32 as an example, but it could be a WDMI-27 or WDMI-37.

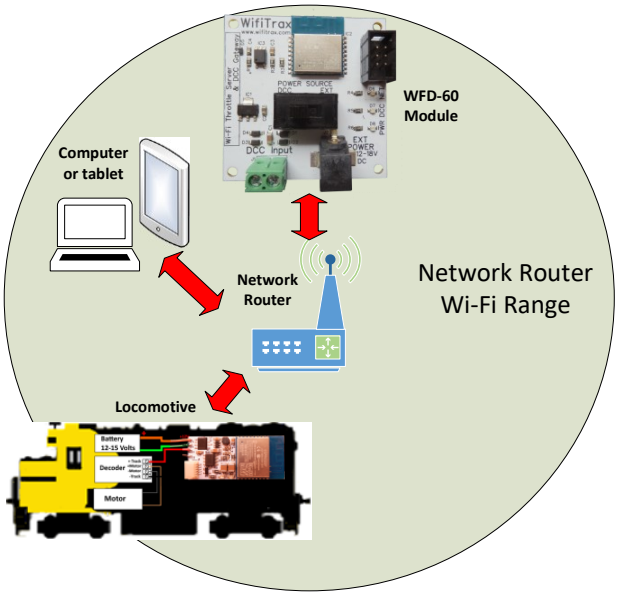


Figure 5 Configuration with one Locomotive and a WFD-60 both on the Home Network

The aim is to have a system as shown in Figure 5 where both the WDMI-32 in the locomotive and the WFD-60 are connected to the Wi-Fi network of the Network Router. The phone, tablets and computers are also connected to the Network Router. The WFD-60 will scan the network to discover the locomotive and send commands to control it when that loco is driven through the WFD-60.

So, here is the setup procedure:

(1) The first thing you have to do is make the WDMI-32 in the loco connect to your router. So, using a computer, tablet or phone connect to its access point wftrx_WDMI32_1_XXXXXXXX_7. You don't need a password of course.

(2) Now open a browser such as Chrome, Edge or Safari and enter 192.168.7.1 into the URL text box and hit enter. This will display the main menu of the WDMI-32 module as Figure 6.

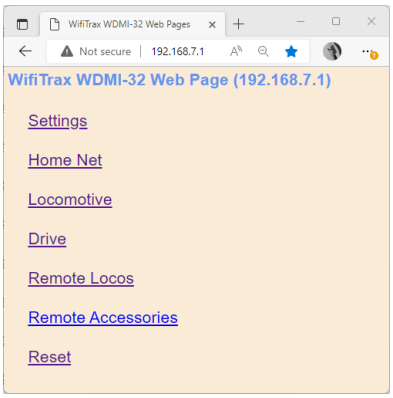


Figure 6 Main Menu of WDMI-32 Module shown in a Browser

(3) Tap or click "Settings" and find the checkbox labelled "WiThrottle Gateway Enabled". Tap this checkbox to clear it. Also clear the checkbox labelled "Rail Mesh Scanning Enabled" as in Figure 7. Now tap the Save button. Once you have done this, you will no longer be able to use WiThrottle protocol apps to connect directly to the module. However, you can always connect with a browser.

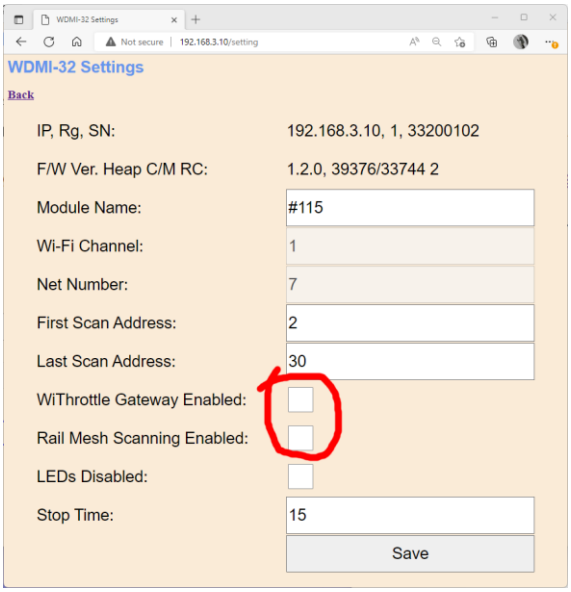


Figure 7 The Settings page of the WDMI-32. Make sure the two checkboxes circled are clear, then Save

Notice that the convention adopted here is that the module is named according to the road number of the loco #115. The DCC address of the loco is also set to 115 on the Locomotive page in Figure 8.

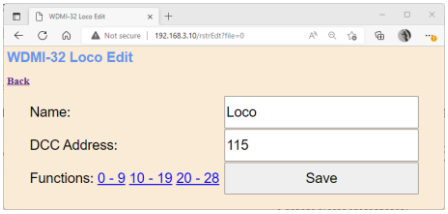


Figure 8 Locomotive Page in the WDMI-32

(4) Now hit the Back hyperlink to go back to the Main Menu, then hit Home Net to display the Home Net page. Then enter the SSID of your router and the Password as in Figure 7. You must not connect to the 5GHz Wi-Fi Access Point since the modules do not support that. Also make sure you don't add any spaces at the end of your password and that the case of all the characters is correct. When you are sure everything is correct, tap the Install button.

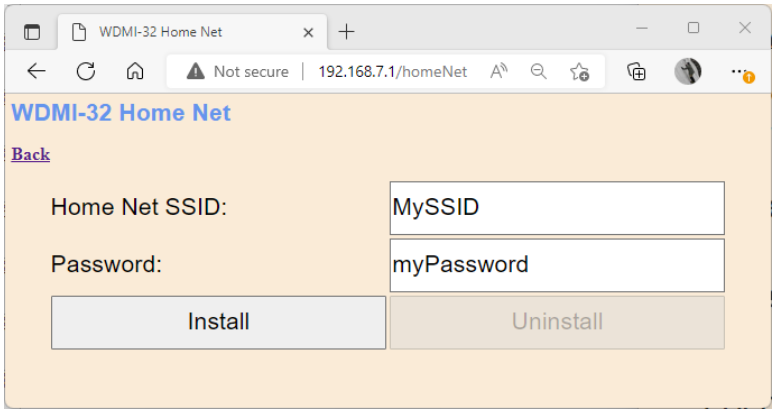


Figure 9 The Home Net page of the WDMI-32. Enter the Correct SSID of your Router and its Password

Your WDMI-32 module will now connect to your home net router. The green LED should come on continuously.

(5) Now you are ready to start working on your WFD-60. On your computer, tablet or phone connect to its Wi-Fi Access Point, wftrx_WFD60_1_XXXXXXXX_7, where XXXXXXXX is its serial number.

(6) Open a browser and type 192.168.7.1 into the URL textbox, then hit enter. This should display the main menu as in Figure 10.

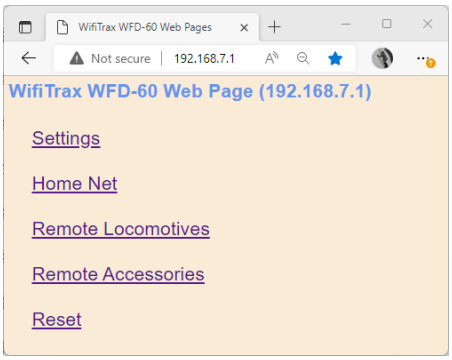


Figure 10 The Main Menu of the WFD-60

(7) After leaving the factory or after a factory reset, the settings are configured to make it easy for you but it's not a bad idea to check so tap "Settings" and verify that the appear as in Figure 11.

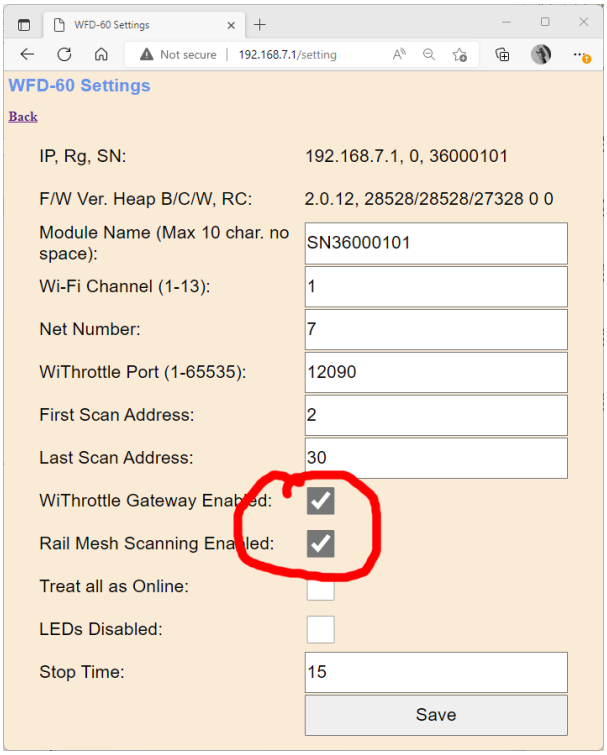


Figure 11 The Settings Page for the WFD-60. Make sure both the Circled Checkboxes are Checked

(8) Notice that both "WiThrottle Gateway Enabled" and "Rail Mesh Scanning Enabled" are both checked, and make sure you leave it that way. The WFD-60 will act as your WiThrottle Server so all the phones using Engine Driver or WiThrottle (or any TCS UWT-100) will find and

connect to that server. The WFD-60 will also scan your home network to find all locos and accessories. This we call the Rail Mesh.

(9) Hit the Back hyperlink to return to the Main Menu then click Home Net. Type the SSID of your home net router and its password, in Figure 12, exactly as you did for the WDMI-32 in your loco. Then tap Install. The WFD-60 should reset and connect to your home-net router. The green LED should light continuously.

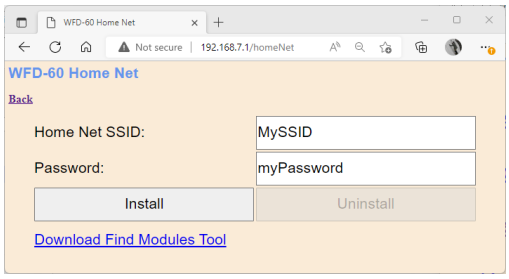


Figure 12 The Home Net page of the WFD-60. Enter the Correct SSID of your Router and its Password.

(10) Now take your phone or tablet and use the Android or Apple Settings to connect to your home net.

(11) Start Engine Driver or the full version of WiThrottle and make sure that it finds the WiThrottle Server of the WFD-60 and connect to it.

(12) Go to the Web Pages so that you see the Main Menu. An example is shown in Figure 13. Make a note of the IP Address circled in Figure 13. This is assigned by your router. In this example the subnet is 192.168.3.0 and the IP Address 192.168.3.20 is the first one found available by the router. Yours might be different like 192.168.15.5 of even something like 10.0.0.9.

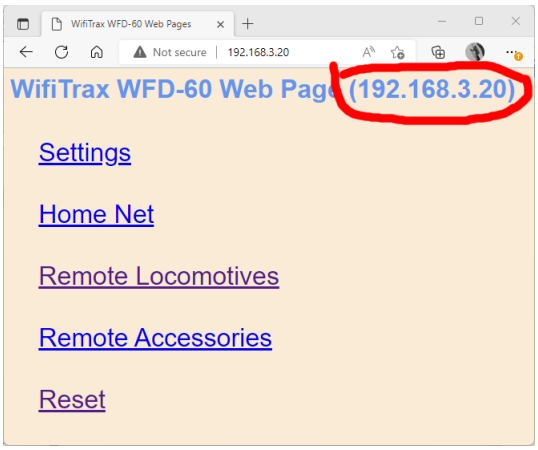


Figure 13 The Main Menu of the WFD-60 once it is Connected to a Home Net. The IP Address is Assigned by Your Router and is Circled in Red.

(13) Now tap Remote Locomotives. You see the WFD-60 Locomotive Roster as in Figure 14. This shows that the loco fitted with the WDMI-32 has been scanned and recorded in the roster.

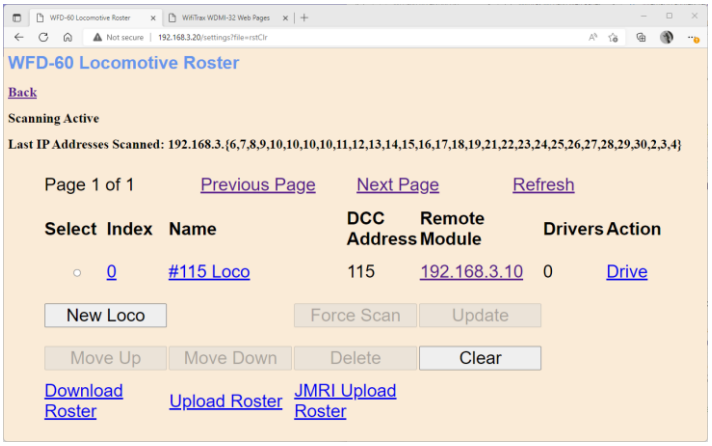


Figure 14 The Scanned Locomotive Roster of the WFD-60, Showing Your First Locomotive

(14) You can now leave the Web Pages and go back to the Throttle page on Engine Driver or WiThrottle, select the loco from the Roster and drive it. Check that all functions work and the loco can be driven forward and backwards.

Other Ways to Drive your Train

You can drive trains using any of the Apps in Table 1. WiThrottle and Engine Driver are apps that use the WiThrottle protocol and provide driving of trains, and control of accessories. The WFD-60 does not currently support routes, layout power or JMRI style panels.

App Name	Author	Get From:	Operating System	Notes	Advanced Features
WiThrottle	Beth Hoffman	Apple App Store	Apple IOS, iPhone, iPad, Mac?		Via Web Pages
WiThrottle Lite	Beth Hoffman	Apple App Store	Apple IOS, iPhone, iPad, Mac?	No Accessories, No web page	Via Web Pages using Safari
Engine Driver	Steve Todd	Google Play Store	Android. Phones, Tablets		Via Web Pages
UWT-100 or 50	Train Control Systems (TCS)	Buy from TCS and dealers	None, Special Purpose Handheld Throttle Device		Can't access web pages. Use browser on another device.
Browser e.g., Edge, Chrome, Safari	Microsoft, Google, Apple	Download free or included with device.	Windows, Apple IOS, Android	Hyperlink in WFD-60 Loco Roster opens Web Drive page in Wifitrax Loco Controller	Use to access all web pages. Use IP address for WFD-60, and hyperlinks to Loco Controller Web Pages

Table 1 Recommended Apps that work with the WFD-60

Driving Trains with a Web Browser

You can also drive trains using a web browser such as Edge, Safari or Chrome by displaying in the browser the Locomotive Roster, Figure 14, and tapping the Drive hyperlink. This will open a new tab

in the browser displaying the Drive Web Page of the locomotive module – in this case the WDMI-32 – shown in Figure 15.

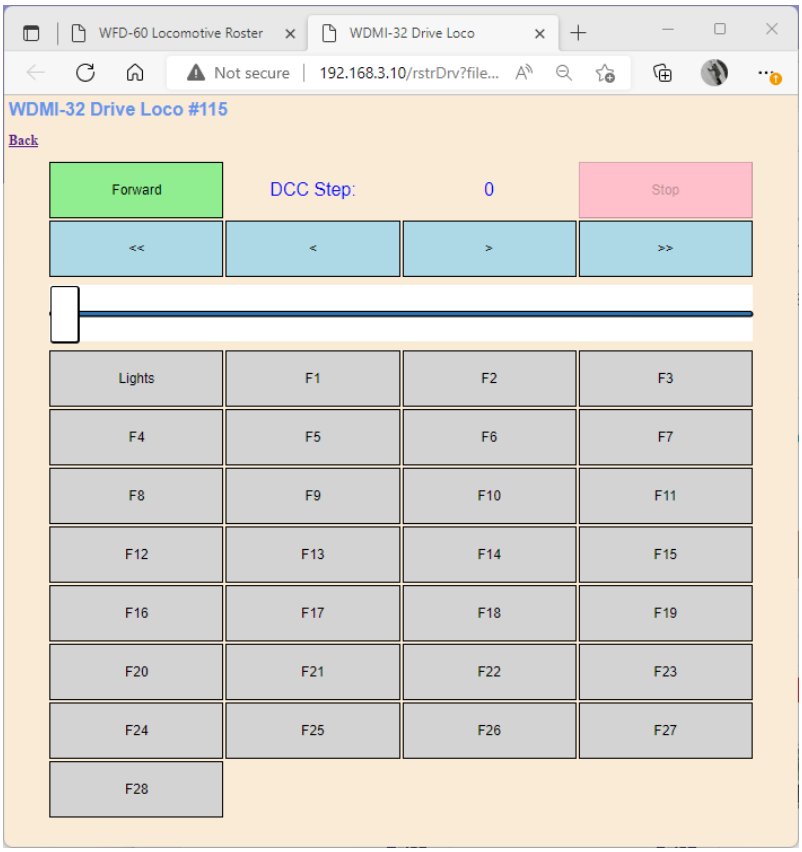


Figure 15 The WDMI-32 Drive Page Opened from the WFD-60

You can also configure the locomotive module using its web pages starting at its Main Menu accessible via the IP Address hyperlink for the loco in the Remote Module column in Figure 14.

Driving with TCS UWT-100 or UWT-50

To use the UWT-100, you need to connect it to the WFD-60 WiThrottle Server in a similar way to any of the apps in Table 1.

(1) Press the menu button (3 horizontal lines), then the Network option (6) as in Figure 16.

Figure 16 Selecting the Network Options menu on the UWT-100

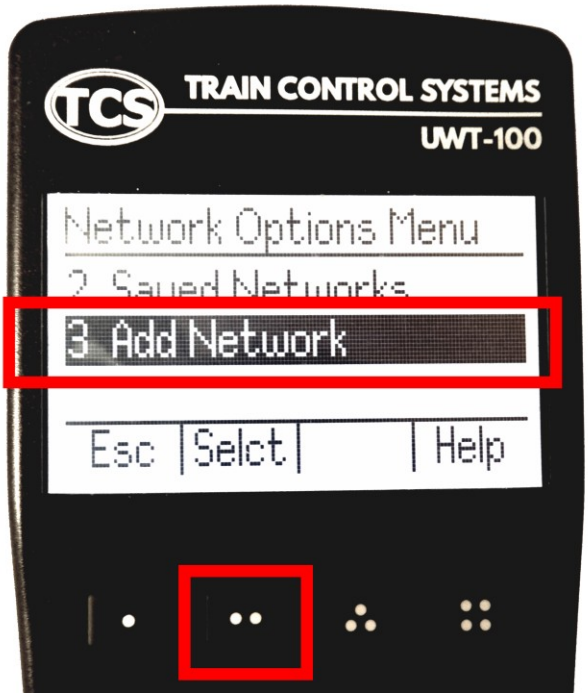


Figure 17 Select the Add Network option

(2) Select option 3, Add Network as Figure 17

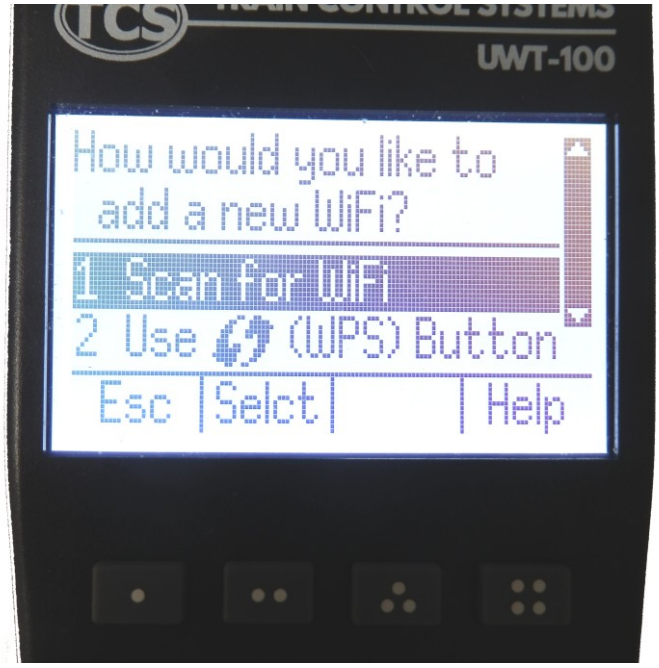


Figure 18 Select Scan for Wi-Fi

(3) Select option 1, Scan for Wi-Fi as Figure 18.

Figure 19 Select the Home Wi-Fi Network

(4) In the Found Networks list, select your home network as Figure 19. Select that Network, using the Selct [..] key.

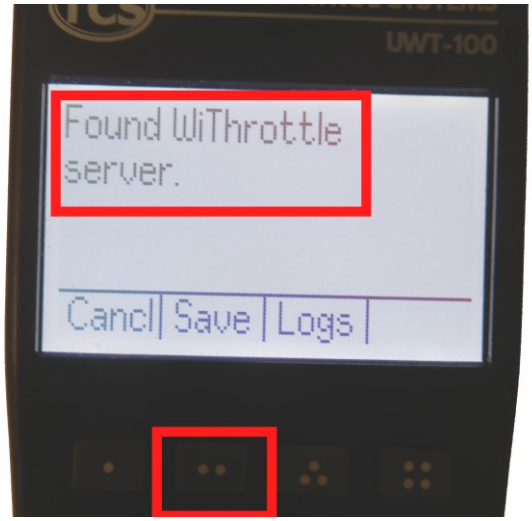


Figure 20 The WFD-60 WiThrottle server has been found. Now save it!

(5) There will be a number of messages appear but eventually you should see the message "Found WiThrottle Server" as Figure 20. Press the Save [..] key.

(6) Briefly, the message "Connected to MySSID" should appear. Of course, MySSID is just an example; yours will be different.

Figure 21 Select a Locomotive from the Roster – in this case the only one.

(7) Press the Locomotive button on the keypad. Select your locomotive from the Roster as Figure 21.
(8) The name of the locomotive should show in the top left of your screen.
(9) Test the lights, horn and bell using the HLght, F2 and F1 buttons (if your loco has sound). Verify that the loco moves forward and backwards using the Up/Down chevron buttons and the thumb wheel. Test the Emergency Stop too!

Connecting Your WFD-60 to Your Wifitrax Switch Machine Controllers

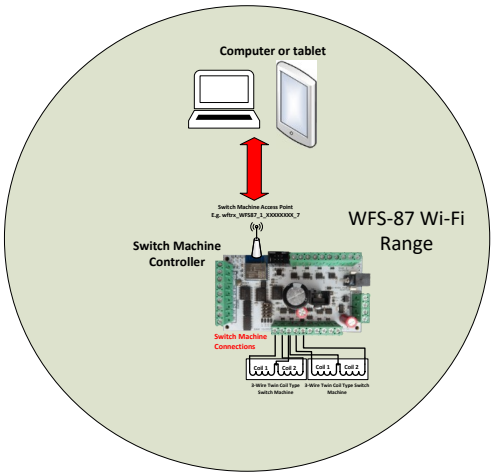


Figure 22 Direct Operation of a WFS-87 Switch Machine Controller. Two Switch Machines are Shown Connected, 8 Channels are Available for Coil or Stall Motor Switch Machines.

The starting point here is that you already have a Wifitrax Switch Machine Controller such as WFS-47 or WFS-87 which you can access on its direct Wi-Fi Access Point e.g., wftrx_WFS87_1_XXXXXXXX_7 and control using a web browser at its IP Address 192.168.7.1 as shown in Figure 22. If you need help getting to this stage, please read the Getting Started leaflet supplied with your switch machine controller module.

Note: The WFS-46 and WFS-86 also work with the WFD-60 and the procedure is the same except that these two modules do not have LEDs which makes it a little more difficult to determine if they have correctly joined your home net. You can access your router admin pages and check the Attached Clients to see if your switch machine is there.

Most people will be using one or more locomotives with the WFD-60 before adding Switch Machine Controllers. However, it is possible to use WFD-60 to control a set of Switch Machines Controller Modules, Lighting Controllers, Track Occupation Detectors and no locomotives. For instance, one could use a WFS-87, two WFS-47 and a WFO-85 and use the WFD-60 to bring them all together in a Panel that displays your whole layout and show track occupation of defined blocks, which could display on any tablet smart phone or computer.

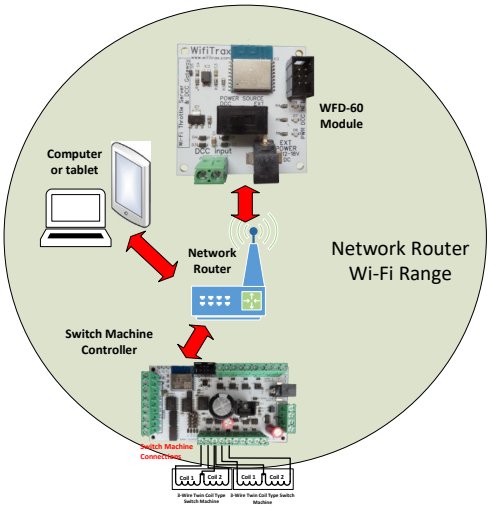


Figure 23 Configuration with one Switch Machine Controller and a WFD-60 both on the Home Network

The aim is to have a system as shown in Figure 23 where both the WFS-87 Switch Machine Controller and the WFD-60 are connected to the Wi-Fi network of the Network Router. The phone, tablets and computers are also connected to the Network Router. Once setup is complete, the WFD-60 will scan the network to discover the Switch Machine Control Channels in the WFS-87 and send commands to control it when points connected to its channels are operated from the WFD-60.

So, here is the setup procedure:

(1) The first thing you have to is make the WFS-87 connect to your router. So, using a computer, tablet or phone, connect to its access point wftrx_WFS87_1_XXXXXXXX_7. You don't need a password.

(2) Now open a browser such as Chrome, Edge or Safari and enter 192.168.7.1 into the URL text box and hit enter. This will display the main menu of the WFS-87 module as Figure 24.

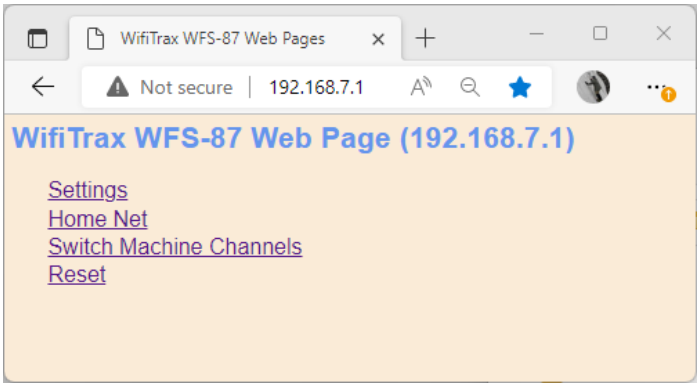


Figure 24 Main Menu of WFS-87 Module shown in a Browser

(3) Now hit Home Net to display the Home Net page. Then enter the SSID of your router and the Password as in Figure 25. You must not connect to the 5GHz Wi-Fi Access Point or the Guest Network as the modules do not support that. Also make sure you don't add any spaces at the end of your password and that the case of all the characters is correct in both the SSID and Password. When you are sure everything is correct, tap the Install button.

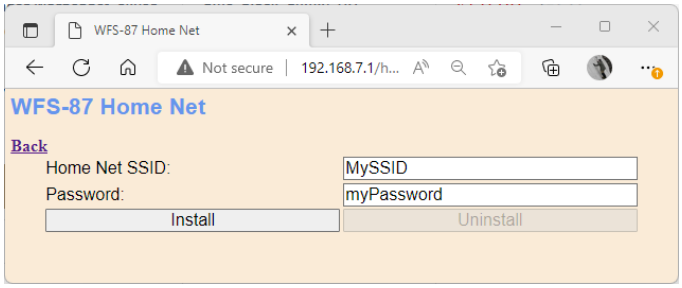


Figure 25 The Home Net page of the WFS-87. Enter the Correct SSID of your Router and its Password

Your WFS-87 module will now connect to your home net router. The green LED should come on continuously.

Note that with the WFS-86 and WFS-46 there are no LEDs. Open the Admin Pages of your router and use the Attached Devices to make sure your WFS-86 or 46 has connected to your home net successfully (See section "Tips to Manage your Home Network").

If you have already joined your WFD-60 to your home net, perhaps when adding locomotives, you can omit steps (4) through (8)

(4) Now you are ready to start working on your WFD-60. On your computer, tablet or phone connect to its Wi-Fi Access Point, wftrx_WFD60_1_XXXXXXXX_7, where XXXXXXXX is its serial number.

(5) Open a browser and type 192.168.7.1 into the URL textbox, then hit enter. This should display the main menu as in Figure 26.

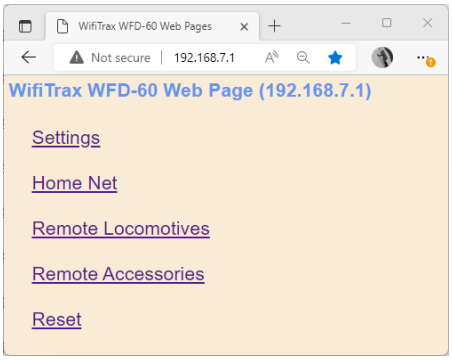


Figure 26 The Main Menu of the WFD-60

(6) After leaving the factory or after a factory reset, the settings are configured to make it easy for you but it's not a bad idea to check so tap "Settings" and verify that they appear as in Figure 27.

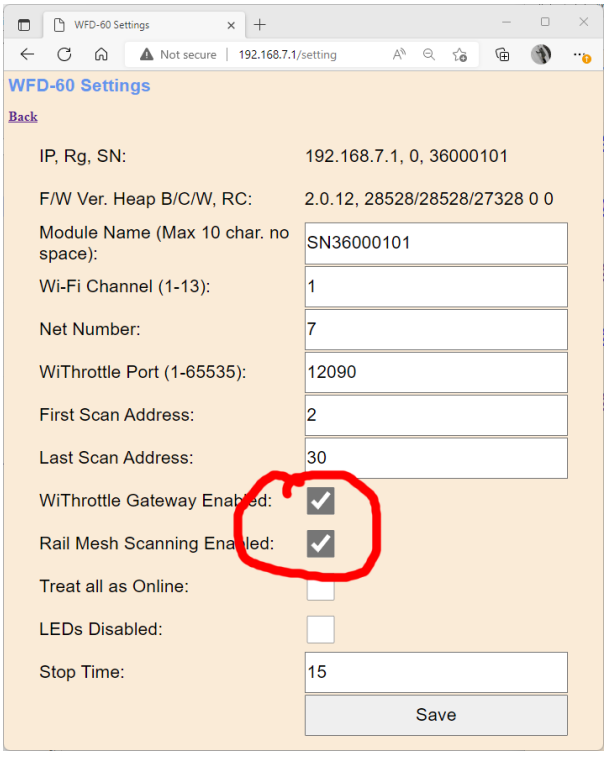


Figure 27 The Settings Page for the WFD-60. Make sure both the Circled Checkboxes are Checked

(7) Notice that both "WiThrottle Gateway Enabled" and "Rail Mesh Scanning Enabled" are both checked, and make sure you leave it that way. The WFD-60 will act as your WiThrottle Server so all the phones using Engine Driver or WiThrottle (or any TCS UWT-100) will find and connect to that server. The WFD-60 will also scan your home network to find all locos and accessories. This we call the Rail Mesh.

(8) Hit the Back hyperlink to return to the Main Menu then click Home Net. Type the SSID of your home net router and its password, in Figure 28, exactly as you did for the WFS-87. Then tap Install. The WFD-60 should reset and connect to your home-net router.

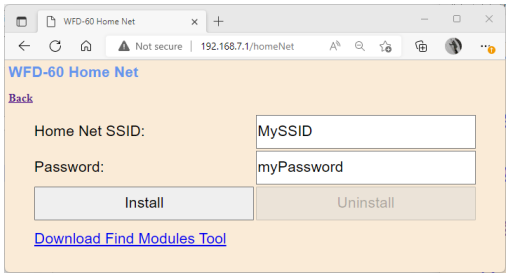


Figure 28 The Home Net page of the WFD-60. Enter the Correct SSID of your Router and its Password.

(9) Now take your phone or tablet and use the Android or Apple Settings to connect to your home net.

(10) Start Engine Driver or the full version of WiThrottle and make sure that it finds the WiThrottle Server of the WFD-60 and connect to it.

(11) Go to the Web Pages so that you see the Main Menu. An example is shown in Figure 29. Make a note of the IP Address circled in Figure 13. This is assigned by your router. In this example the subnet is 192.168.3.0 and the IP Address 192.168.3.20 is the first one found available by the router. Yours might be different like 192.168.15.5 of even something like 10.0.0.9.

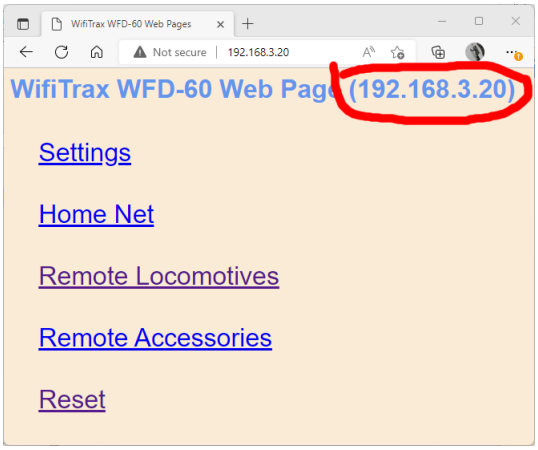


Figure 29 The Main Menu of the WFD-60 once it is Connected to a Home Net. The IP Address is Assigned by Your Router and is Circled in Red.

(12) Now tap Remote Accessories. You see the WFD-60 Accessory Roster as in Figure 30. This shows that the accessory channels of the WFS-87 have been scanned and recorded in the accessory list.

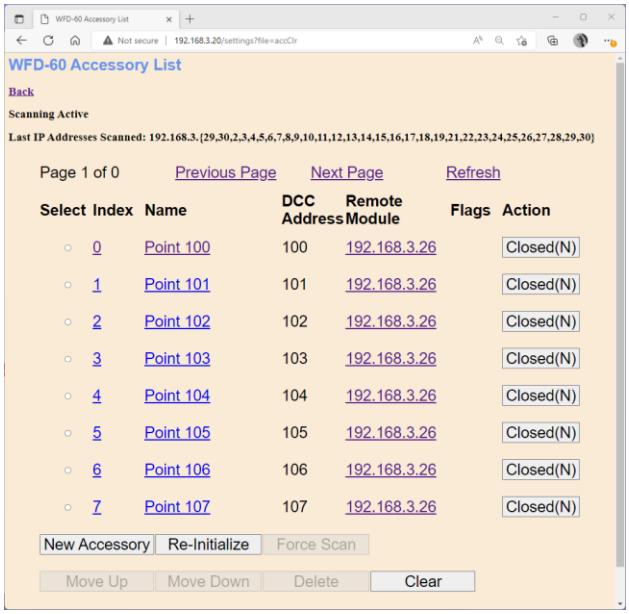


Figure 30 The Scanned Accessory List of the WFD-60, Showing the Switch Machine Channels

(13) You can now leave the Web Pages and go to the Points page on Engine Driver or WiThrottle, you can operate the points using the buttons on the screens in either the WiThrottle or Engine Driver apps.

(14) Now try connecting to the WFD-60 with an ordinary browser such as Edge on Windows, Safari on Apple IOS or Chrome on Android. Use the IP Address Assigned to the WFD-60 which in this example is 192.168.3.20, but in your case, you will get from Step (11) earlier.

(15) You can operate switch machine channels using the buttons in the Action column in Figure 30.

Operating and Configuring Switch Machine Controllers

There are many ways to operate switch machines through the WFD-60:

(1) Connect a browser such as Edge, Chrome or Safari to the WFD-60 IP Address and display the WFD-60 Accessory List. Toggle the points by clicking the buttons on the right.

(2) With the same browser, create WFD-60 Panels. Add a track diagram with turnouts and control them by tapping on their symbols.

(3) Use a WiThrottle Protocol app such as WiThrottle on Apple, Engine Driver on Android. Select the Points Screen and the Server Define list. Toggle points by clicking the buttons. Of course, you can use the same app to drive locos.

(4) Use the UWT-100 in the same way as in (2) to control points using its Points screen.

(5) Use the Remote Module hyperlink on the WFD-60 Accessory List, to go to the module's own menu, select Switch Machine Channels and operate the points using the buttons on the right. If you change points in this way, for versions below 2.6, the WFD-60 will not update to show their settings and neither will connected clients running the WiThrottle/Engine Driver app.

(6) Via the DCC inputs to the WFD-60 module from a DCC Command Station. Use a DCC Cab to control the points using their DCC Addresses as shown in the DCC Address column in Figure 30. If you use WFS-47 or WFS-87, do not connect your DCC Command Station directly to the Switch Machine Control Modules as well as to the WFD-60, otherwise the results will be confusing.

Using the WFD-60 Web Pages

The WFD-60 provides many features which are made available via web pages that you can access with a browser.

Accessing the WFD-60 Setup Web Pages

The WFD-60 web pages may be accessed via any browser or from within apps such as Engine Driver and WiThrottle. Note that WiThrottle Lite does NOT provide this feature, but you can use Safari instead on an Apple device. Please understand that these web pages are NOTHING TO DO WITH THE INTERNET OR THE WORLD WIDE WEB! The web pages are served **from the WFD-60 itself** so you do not need to be connected to the internet. The WFD-60 just uses the same protocol as the internet, that is, HTTP and HTML as well as JavaScript.

Limitations of the Built-in Web Browser included in the WiThrottle and Engine Driver apps.

The Engine Driver and WiThrottle apps running on Android or Apple IOS have a built-in Web Browser that can be used to access the WFD-60 Web Pages used for setup. However, some of these pages use features that are not provided by this built-in browser. Examples are the Clear button on the WFD-60 Accessory List and WFD-60 Locomotive Roster and the Download and Upload Roster features. To use these features, open a complete Web Browser such as Safari, Edge or Chrome on your hand-held device or computer and access the IP Address of the WFD-60 Module.

Accessing WFD-60 Web Pages using Engine Driver

(1) Connect to the Wi-Fi Access Point that your WFD-60 is using.
   a. If you are working in direct mode, that is you have not set up a home net yet, connect to the wftrx_WFD60_6_XXXXXXXX_7 Wi-Fi access point using the Settings App on your Android device.
   b. If you are working in Home-Net mode, you need to connect to your home Wi-Fi network.

(2) Run Engine Driver and on the Connect to Server page select the SNXXXXXXXX entry in the Discovered Servers list. If you have changed the module name, your new module name will appear in this list instead.

(1) Tap the “three dots” icon at the top right of the screen and select Web in the menu. You should now see the Web Setup Main Menu as in Figure 31. You can click or tap on any of the headings in the menu to access the setup for that feature. The section “Setup Advanced Features using a Web Browser” provides information about all of the menu options.

Accessing WFD-60 Web Pages using WiThrottle

(1) Connect to the Wi-Fi Access Point that your WFD-60 is using.
   a. If you are working in direct mode, that is you have not set up a home net yet, connect to the wftrx_WFD60_6_XXXXXXXX_7 Wi-Fi access point using the Settings App on your Android device.
   b. If you are working in Home-Net mode, you need to connect to your home Wi-Fi network.

(2) Run WiThrottle and the Connect to Server will display. Select the SNXXXXXXXX entry in the Available WiThrottle Servers list. If you have changed the module name, your new module name will appear in this list instead.

(2) You now should see the WiThrottle Address page. At the bottom there should be four tabs Throttle, Address (highlighted in blue), WebServer and Settings. Tap on the WebServer tab and you should now see the Web Setup Main Menu as in Figure 31. You can click or tap on any of the headings in the menu to access the setup for that feature. The section "Setup Advanced Features using a Web Browser" provides information about all of the menu options.

Note: WiThrottle Lite does not have this WebServer tab so if you are using the Lite version you will have to use Safari as described in the section "Setup Advanced Features using a Web Browser"

Setup Advanced Features using a Web Browser

(1) On your hand-held device or computer open a browser such as in Table 2.

Device	Operating System	Browser Options
iPhone, iPad	IOS	Safari
Android Tablet or Phone	Android	Chrome
Windows Computer	Windows XP, 7, 8, 10,11	Internet Explorer, Edge, Chrome, etc.

Table 2 Web Browsers available on different platforms

(2) If you are working in Direct Mode, connect your device to the Wi-Fi Access Point of your WFD-60, that is wftrx_WFD60_1_XXXXXXXX_7, where XXXXXXXX is the 8-digit serial number. If you are working in Home Net mode connect your device to your home net.

(3) Type the IP Address of the WFD-60 into the Address Bar of the browser.

a. In Direct Mode type 192.168.7.1 and hit the enter key or "Go" button (the http:// may appear automatically. Do NOT use "https" (the WFD-60 does not support secure sockets).

b. In Home Net mode, type the IP Address that was assigned by your router and hit the enter key. Please see the section "Tips to Manage your Home Network" *to* see how to find this out.

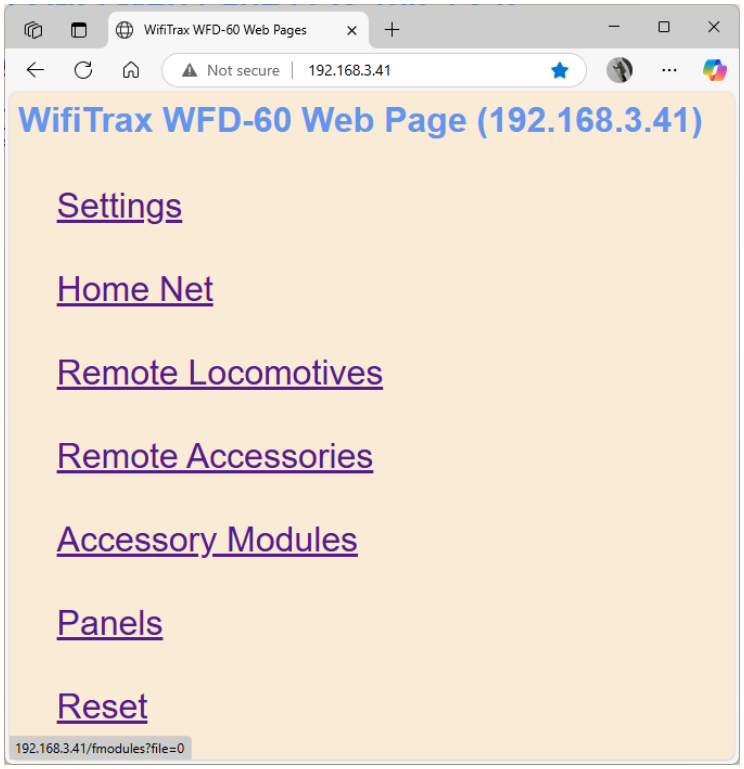


Figure 31 The WFD-60 Web Setup Main Menu (Note: Panels is only present in version 2.2.0 and above. Accessory Modules is only present in versions 2.6 and above)

(4) You should now see the Web Setup Main Menu as in Figure 31. You can click or tap on any of the headings in the menu to access the setup for that feature.

General Settings Web Page

To modify General Settings, tap the “Settings” heading in Figure 31.

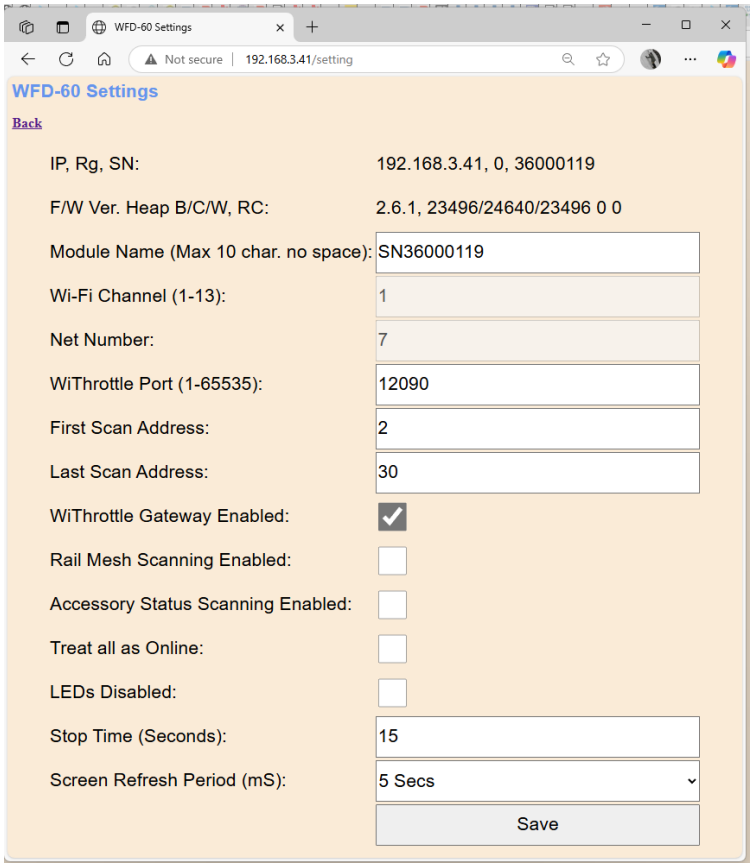


Figure 32 The WFD-60 General Settings Web Page. (The Accessory Status Scanning and Screen Refresh Period options are only present in version 2.6 and above)

The first line contains the IP address (IP), the Region Code (Rg) and the Serial Number (SN)

IP Address

If you are working in direct mode this will display 192.168.7.1. If you are in Home-Net mode it will display the IP Address assigned to the module by your router. You cannot change this from the Settings page, but you should keep a note of it since it is needed to access these Web Pages. Better still add it to your browser favourites and consider setting an IP Address Reservation in your router..

Region Code

This will be 0 for all regions other than the Americas or 1 for North and South America. In the Americas only Wi-Fi channels 1 – 11 are allowed whereas in the rest of the world 1 – 13 are permitted, both by law and by the firmware.

Serial Number

This is a unique number for your particular module. You may be asked for this if you request help or report a problem to Wifitrax.

The second line shows Firmware Version (F/W Ver.), Heap space Maximum/Current/Minimum over a period of a minute, number of locos being driven and number of connected clients.

Firmware Version

This is the version of the WFD-60 firmware installed at the factory. You cannot change this but if you ask for WifiTrax support, you may be asked for it. You can upgrade your firmware using WifiTrax Workshop and the FWA-20 Workshop Adapter Module.

Module Name

This defaults to the value SNXXXXXXXX where XXXXXXXX is the 8-digit serial number. You can change this to a name up to 10 characters long which cannot include spaces. Type the name you want in the text box (such as "Gateway") and tap Save. After cycling power, this name will appear to all apps using WiThrottle protocol such as Engine Driver and WiThrottle as the name of the discovered WiThrottle Server.

Wi-Fi Channel

This is a generic feature of Wifitrax Modules. Since the WFD-60 is only useful when in Home-Net mode, setting the channel is irrelevant.

This is the Wi-Fi channel in the 2.4GHz Wi-Fi band that the WFD-60 will use only when operating in Direct Mode. It will have no effect in Home Net mode as the channel will be determined by your router. You can set the channel to a value from 1 to 13, (1 to 11 in the Americas) and the default value is 1 after a factory reset. You do not normally need to change this but it may be helpful if other interfering devices are being used nearby. You need to cycle power before the channel change will have an effect. Once you have cycled power, the WFD-60 Wi-Fi access point will be of the form wftrx_WFD60_N_XXXXXXXX_7 where N is your selected channel.

Note: Only channels 1 to 11 may be used in North and South America and Taiwan, 1 to 13 may be used in Europe and Asia/Pacific. It is your responsibility to avoid breaking the law by adhering to these conditions.

Net Number

This is a generic feature of Wifitrax Modules. Since the WFD-60 is only useful when in Home-Net mode, setting the net number is irrelevant.

This defines the subnet that the WFD-60 will use to set its own IP Address and to allocate IP Addresses to hand-held devices that connect in Direct Mode.

It has no effect in Home Net mode.

If you change this value, by typing an integer from 1 to 14 and tapping Save, the WFD-60 will use this after cycling power. The subnet will be 192.168.N.0 where N is the net number. The unit's IP Address will then be 192.168.N.1 and it will assign IP Addresses: 192.168.N.2 to 192.168.N.5

The WFD-60 Wi-Fi access point will be of the form wftrx_WFD60_1_XXXXXXXX_N where N is your selected net number.

First Scan Address

When Rail Mesh scanning is enabled (see Sections "How Locomotives are Added to the Roster by Scanning" and "How Accessories are Added to the List by Scanning") this will be the first IP Address in the scanning range. Scanning will begin at this value.

Last Scan Address

When Rail Mesh scanning is enabled (see Sections "How Locomotives are Added to the Roster by Scanning" and "How Accessories are Added to the List by Scanning") this will be the last IP Address in the scanning range. Scanning will begin at the first scan address defined above, in the subnet and end at this value.

WiThrottle Gateway Enabled

Checking this box enables the module as a WiThrottle Server. If you uncheck this box WiThrottle Protocol apps and devices such as WiThrottle on Apple, Engine Driver on Android and the UWT-100 or 50 will not see the module and connect to it. This setting is enabled by default.

Rail Mesh Scanning Enabled

Checking this box enables scanning for other modules that can be controlled from this module as a WiThrottle server (see Sections "How Locomotives are Added to the Roster by Scanning" and "How Accessories are Added to the List by Scanning"). This is enabled by default. Scanning only occurs when the module is working in Home-Net mode and only takes place when the module is not currently being used to drive any locomotive. Scanning only detects locos that are on the home net.

Once you have scanned all your loco and accessory modules, or if you have entered all your modules manually, you can uncheck this and click the save button. You can always scan just once by using the Force Scan button on the Loco Roster page.

Accessory Status Scanning Enabled

This option is only available in version 2.6 and above. Checking this box before clicking the Save button enables scanning of selected modules to determine the state of their channels as displayed in The Remote Accessories screen and Panels screens. Scanning can be turned on or off and its rate can be selected for each accessory module. This is available via the Accessory Modules screen. Accessory Status Scanning can only be turned on when Rail Mesh Scanning is disabled, so only use this when you have determined all the Accessories and Locos on your layout.

Treat All as Online

Some versions of the WFD-60 firmware make a distinction between locomotives found to be online and those that are not, perhaps because they are unpowered or their IP Address has changed. When this is checked, no distinction is made between online and offline locos.

LEDs Disabled

When this checkbox is checked, the LEDs on the module are disabled, except the red Power LED. Some users may be annoyed by flashing LEDs and use this to reduce distraction.

Stop Time

This specifies the time in seconds that a loco will run, after contact is lost, before being stopped. It is also the period at which a WiThrottle client such as WiThrottle or Engine Driver is required to send a heartbeat to maintain connection. The WiThrottle app will stop any locos being driven if you go away from the Throttle screen for a period exceeding this value. The default value is 15 seconds.

Screen Refresh Period (mS)

This option is only available on versions 2.6 and above. You can use this option to determine the screen refresh rate for the Remote Accessories and all Panel screens. It can be set to a range of values between 0.2 Seconds and 5 Seconds. If you are using Wifitrax Track Occupancy detectors to display occupancy of track sections on a Panel, you may wish to set this to a short period.

Home Net Web Page

Remember, Direct Mode is when you connect your tablet or computer to the module's access point, wftrx_WFD60_1_XXXXXXXX_7. Home-Net mode is when the module connects itself to your router and you access it via your router.

This page allows you to change your WFD-60 from Direct Mode to Home Net Mode and back again. Once you have changed to Home-Net mode, you will not be able to work in Direct Mode, but if for some reason the WFD-60 cannot join your Home Net (maybe you typed it wrong, put in the wrong password or the router was turned off), the WFD-60 will attempt to connect for about 30 seconds then revert to Direct mode. You will then see the wftrx_WFD60_1_XXXXXXXX_7 access point which you can connect to and correct the problem. It's always worth restarting your home router if you've checked everything and connection does not succeed, as these so often seem to get locked up somehow!

To change to Home Net mode, tap the Home Net heading in Figure 31. Optionally download the FindModules app for later use (see section "FindModules App").

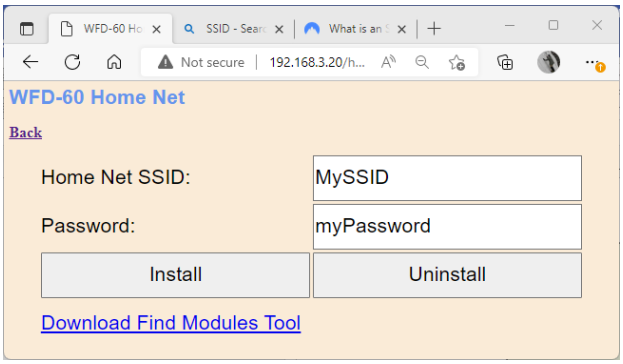


Figure 33 The Home Net Web Page

Figure 33 shows the Home Net web page. Your Home Net SSID (Service Set IDentifier) is the name of your home network.

Type the SSID of your home Wi-Fi router in the Home Net SSID textbox. This must be the SSID of a 2.4GHz Wi-Fi Access Point.

Some routers provide both 2.4GZ and 5GHz Wi-Fi Access Points. They also sometimes provide a Guest Network. **The 5GHz Access Point will NOT work and neither will the Guest Network.** If you have renamed your access points on your Wi-Fi Router take a look at the Admin Pages on your router to check which is the correct one.

Type the password (shared key) for your home Wi-Fi Access Point into the Password textbox. Be careful as **both** SSIDs and passwords are case sensitive and take care not to add any extra spaces to your password at the beginning or end.

Check the section “Tips to Manage your Home Network” to see some tips on finding out the SSID and password for your home network. This will often be provided by your internet service provider on a card, but you may have changed it.

When you are satisfied these are correct, tap “Install”. The unit will restart and connect to the Home Wi-Fi Network you have specified. To continue to drive your locomotive, you must reconnect your phone, tablet or computer to your home network and use the WFD-60’s IP Address on that network.

To obtain the roster and drive trains when operating in Home Net mode, make sure your device is connected to your home net, then run Engine Driver or WiThrottle. Select the WFD-60 WiThrottle server from the Discovered Servers list. You can note down the IP Address of this server for future use.

On some networks the WFD-60 might not be seen as a Discovered Server. In this case, manually configure using the IP Address assigned to the WFD-60 module. Either use the FindModules app or see the section “Tips to Manage your Home Network” to find the IP Address and to set your router so it always assigns the same address. Once you have connected to the server, the operation of Engine Driver and WiThrottle is the same as in Direct mode.

To access the web pages, you need to use the IP address that has been allocated to the WFD-60 by your router instead of the fixed 192.168.7.1 address in direct mode. Engine driver provides a menu item to access the web page and WiThrottle – Full Version shows a tab at the bottom.

FindModules App

This is a simple Web Page that uses JavaScript to find your WFD-60 module on your network. If you click on it before you connect your module to your home network, a file will be downloaded by your browser and saved in your Downloads folder. This should automatically display or you can use your browser menu to open it. It will not be downloaded if you are using the in-built web browser of WiThrottle or Engine Driver. You must use a proper browser.

After you have connected the WFD-60 to your home net, and returned your computer to your home net, opening the file from the Downloads folder will display a screen as in Figure 34.

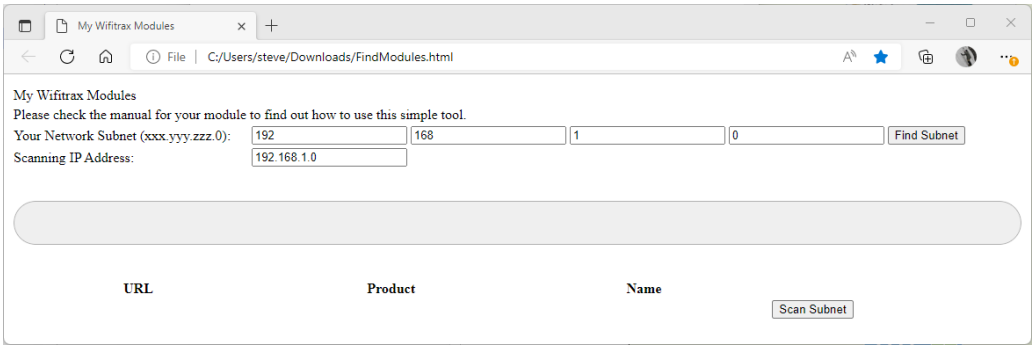


Figure 34 The FindModules Screen.

To use this tool, you must first find out your subnet. If you know this, type it in and click the Find Subnet button. The Subnet should display green. Your subnet is usually the first three numbers of your computer’s IP Address, followed by zero, so if your computer’s IP Address is 192.168.15.5, your subnet is usually 192.168.15.0.

Once you have the right subnet as in Figure 35, tap the Scan Subnet button. The tool will test all the addresses on the subnet until the WFD-60 is found and display its details as Figure 36. Click on the URL to open the WFD-60 Main Menu.

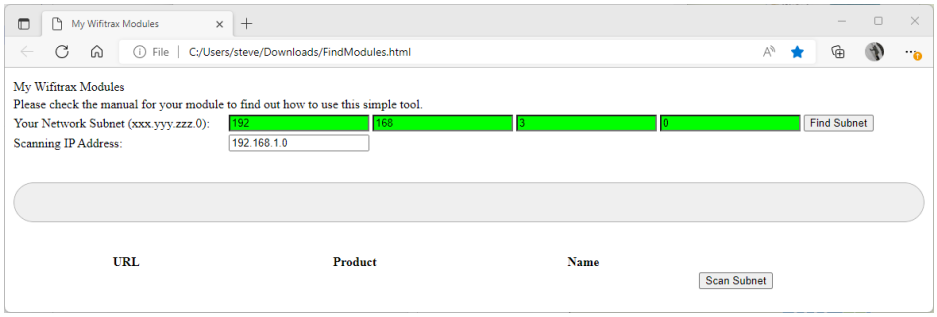


Figure 35 The FindModules tool shows that the correct subnet has been found.

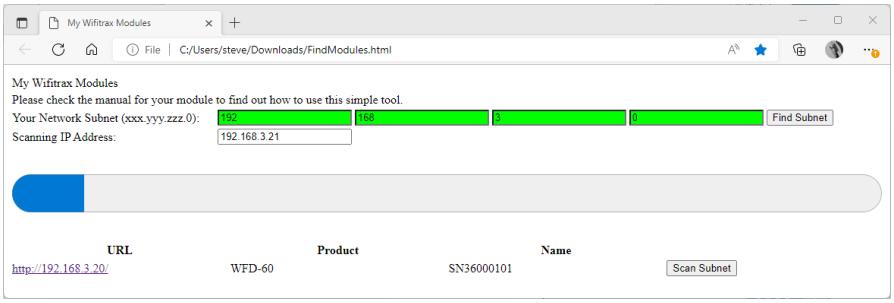


Figure 36 The FindModules tool shows that the WFD-60 Module has been found.

Changing IP Addresses due to Router Restart

It is likely that if you restart your router, the IP Addresses assigned to your modules will change so it is a good idea to go to your router admin pages and assign reserved IP Addresses to all your modules including the WFD-60. See the section “Tips to Manage your Home Network”

Locomotive Roster

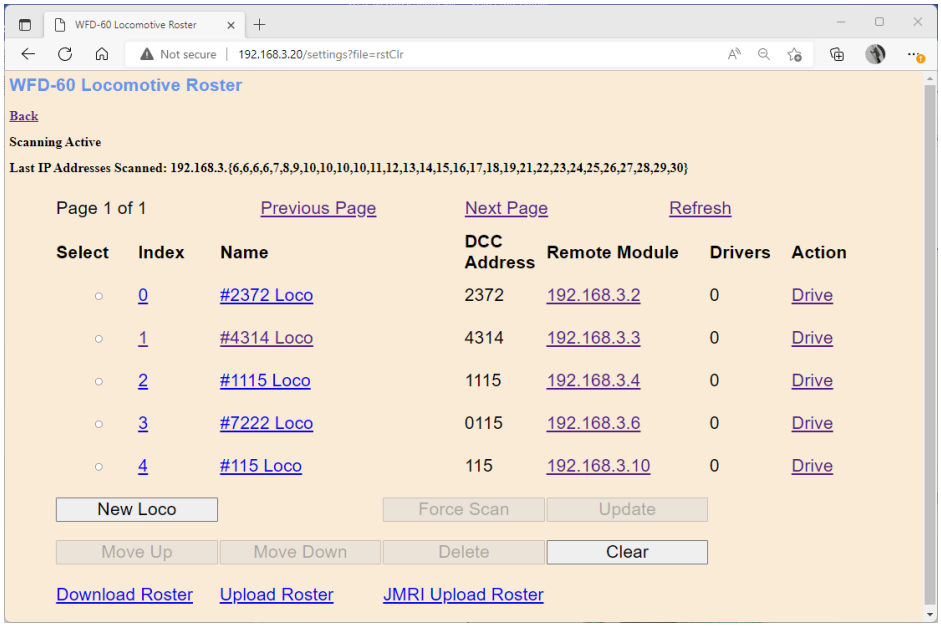


Figure 37 The Locomotive Roster Page

The Locomotive Roster Page in Figure 37 shows the locomotives fitted with Wifitrax modules on your home net that are available to drive from the WFD-60. This is its Locomotive Roster. This roster will be delivered to a WiThrottle Protocol app such as Engine Driver or WiThrottle or a device such as UWT-100. The roster on those devices will appear in the same order as displayed on this page.

The roster is populated in two ways:

(1) By the WFD-60 Scanning Process. The WFD-60 automatically scans a range of IP Addresses on your home network between the bounds defined in the Settings page as First Scan Address and Last Scan Address. The scanning process only occurs if the Rail Mesh Scanning Enabled checkbox is checked, or if you have clicked the Force Scan button when it will occur just once. Scanning is enabled by default after leaving the factory and after a factory reset. By default, the First Scan Address is set to 2 and the last is set to 30. If you have many computers or devices on your home network, you might need to extend this.

(2) By adding locomotives manually. The New Loco button on the Locomotive Roster page will add a new locomotive to the roster. The new loco, in Figure 39, will have default values which will not normally represent a loco on your layout, so you will have to define the settings manually as in Figure 40.

Up to 100 locomotives can be recorded in the Locomotive Roster and entries are indexed from zero to 99. The index value defines the position in the roster and roster entries displayed on the Locomotive Roster Page in Figure 37 are paged with ten entries per page, the Previous Page and Next Page hyperlinks enabling access to the required page.

All entries must have a unique DCC Address which is used to identify an entry in the roster. When a new loco is added, it will be placed in the next available index position and receive, by default, the lowest available unique DCC address.

How Locomotives are Added to the Roster by Scanning

Scanning takes place as soon as the WFD-60 connects to your home network, provided the Rail Mesh Scanning Enabled checkbox is checked. Beginning at the First Scan Address, the module will try to detect a Wifitrax modules at each address in turn, by sending a message, until it reaches the Last Scan Address, then it will begin again at the First Scan Address and repeat.

Scanning will be paused if a locomotive is being driven using the WiThrottle interface, with the Engine Driver or WiThrottle app or the UWT-100. It will also be paused when a loco is being driven through the DCC Interface from a DCC Command Station. A single scan of the specified first-to-last range can be forced by clicking the Force Scan button.

Each time a Wifitrax module in a locomotive responds to the scanning message, the WFD-60 will add the locomotive to the roster at the lowest available index position. The Name of the locomotive will be set to the Name of the module as defined in its Settings page, joined to the name of the Locomotive in the module's Locomotive page. The DCC address will be the value defined in the module's Locomotive page. So, for the first loco in Figure 37, the module name was set to "#2372" and the Locomotive name was set to "Loco". The DCC Address was set to 2372 in the loco module and the locomotive was found at IP Address 192.168.3.2.

Also, when a locomotive is found because it responds to the scanning message, the WFD-60 sends it some Information request Messages. These retrieve more information about the loco module, in particular its DCC Function Code labelling. So, you can set all your function labels in the locomotives

and these will be used to define the labels that are held in the roster. These labels will be sent to any connected WiThrottle Protocol device, like the Engine Driver and WiThrottle apps as well as the UWT-100, when a loco is selected from the roster. You can force an immediate update of the function labelling for any loco by selecting that loco using its left-hand checkbox and clicking the Update button.

The status of the scanning process is displayed at the top of the Locomotive Roster page as Figure 38. Scanning is shown as Active or Paused, then under that, a list of the last IP Addresses scanned appears. For brevity, the first three digits of the IP Address Subnet are shown only once and then the last IP Addresses within the subnet scanned up to approximately the 30 most recent. So, in the example, the IP Addresses recently scanned are 192.168.3.2, 192.168.3.3, 192.168.3.3, 192.168.3.3, 192.168.3.3, 192.168.3.4, 192.168.3.4 and so on. Notice that 192.168.3.3 was scanned four times, the first discovered the loco and the other three retrieved function label information. Once a loco has been entered in the roster, it will not be entered a second time but its function labelling will be updated each time it is detected during scanning.

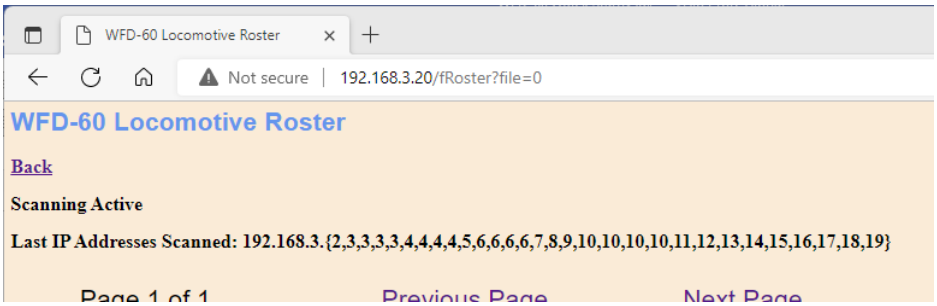


Figure 38 The Scanning Status Shown on the Locomotive Roster Page

Adding a New Locomotive Manually

To add a loco manually, click the New Loco button and a default loco will be added. But before this will be of any use, the details must be edited to correspond to a locomotive on your home net with the correct DCC Address and IP Address.

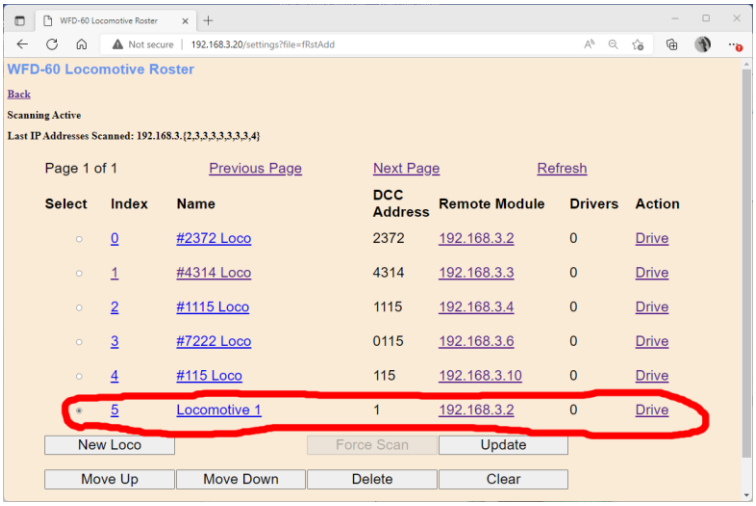


Figure 39 The Locomotive Roster Page after the New Loco Button is Clicked.

Usually, locos will be added manually when the locomotive is already joined to the home net and an IP Address Reservation allocated to it in the router (see the section “Tips to Manage your Home Network”).

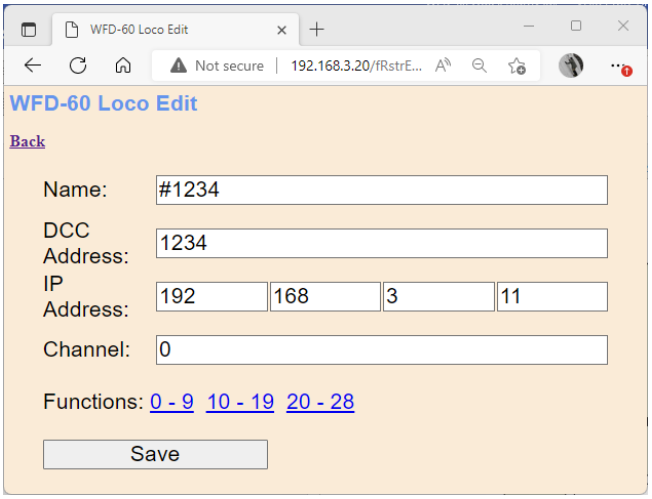


Figure 40 The Loco Edit Page. Setting the Properties of a New Locomotive to Useful Values.

Clicking the hyperlink on Figure 37 formed by the index or the name of the Locomotive, will open the Loco Edit page in Figure 40. Do not click the Remote Module hyperlink at this time.

- Enter a name, up to 15 characters long.
- Type the correct DCC address of the loco, (1 – 9999). If the DCC Address is less than 128, but you wish this to be a long address precede it with a leading zero e.g., 0115 is 115L.
- Type the correct IP Address.
- Type the channel number which will usually be zero. (The channel number will be non-zero for accessories and in some cases locos where the Wifitrax module has control of more than one locomotive.)

Finally, click Save to save the values permanently for this entry in the roster.

Function Labelling Web Page

If you want to add function labels, in the edit page for the required loco tap one of the Functions hyperlinks, either “0 – 9”, “10 – 19” or “20 – 28”. The selected range of functions is displayed for that locomotive as in Figure 41.

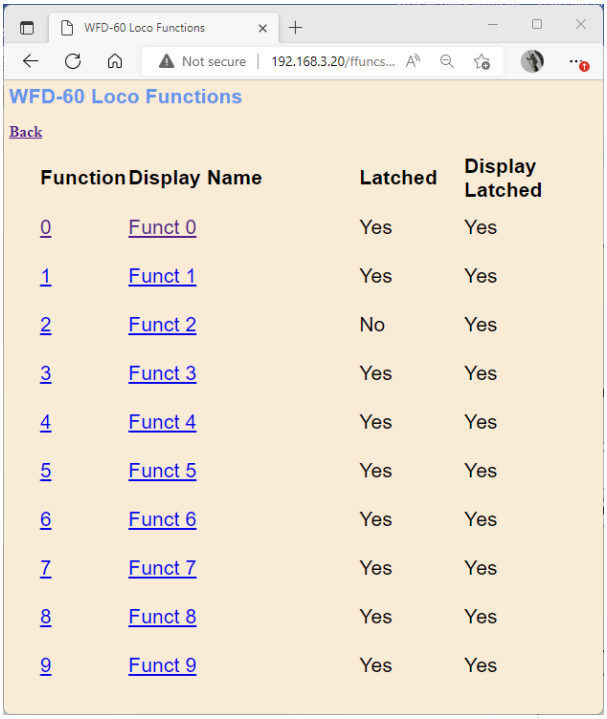


Figure 41 The function labels displayed for a given locomotive

To edit any function, click the name of the function and change its name in the textbox. The name can be up to 10 characters long. You can also change whether the function is latched or not using the "Latched" checkbox. When a function is latched, the WFD-60 will send a 1 value when the key is first tapped, then a 0 value when it is tapped a second time. For unlatched functions a 1 is sent when the button is pressed and a zero when released. There is also a "Show Latched" checkbox that is occasionally useful. We have found some DCC decoders seem to perform the function once on each transition, so sometimes it is useful to mark a function as latched but to display is as though it were not latched.

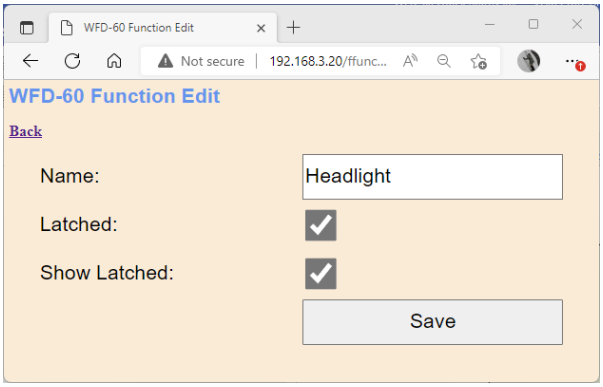


Figure 42 Editing a function key for a given locomotive

Deleting and Moving Locos Up or Down

You can delete a loco in the roster by selecting it using the radio button in the left-hand column and tapping the Delete button. after a warning, the rostered loco will be deleted. This operation cannot be reversed.

All locos in the roster have an index. This simply indicates the position of the locomotive in the roster. If you delete a locomotive, a gap will occur in the indices. Adding new locos will fill any gaps in the roster index sequence before appending new locos at the bottom.

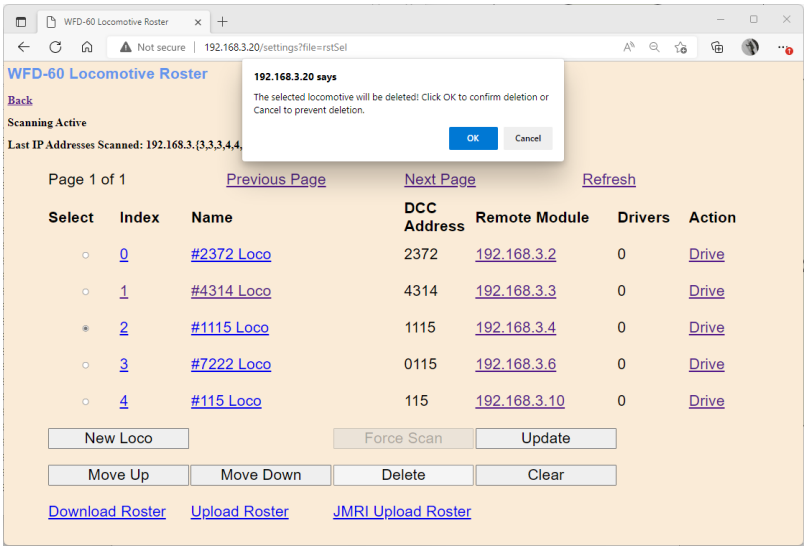


Figure 43 Deleting a loco from the roster

A loco may be moved upwards and downwards in the roster. To move a roster down by one step, select the required loco by clicking the radio button at its left. Then click Move Down. The index of the selected loco will be increased by one so that the loco will move one place downwards in the roster. Similarly, you can move a loco one place up by selecting and clicking the Move Up button. Note that if you have gaps in the index sequence, locos will increase or decrease their index as they move through the gap and only appear to move down or up when an adjacent index is occupied.

Clearing the Entire Locomotive Roster

You can clear the entire roster and begin again by clicking the Clear button. After a warning, all locos will be deleted. This operation cannot be reversed. However, if you have downloaded some or all of your locomotives you can restore them by uploading the file as described in the Section “Uploading a Previously Downloaded Locos File”.

Downloading Locomotives to a File

Once you have set up a set of locomotives in your roster, including function names, it is a good idea to download and store it in a file on your PC or other device. For example, if you need to reset the module for some reason, the roster will return to its default and you will have wasted all that work. You also might like to have separate rosters if you use the WFD-60 at a club as well as your own layout.

IMPORTANT: On the Engine Driver and WiThrottle apps, you cannot use the Web display within the app to download or upload a locomotive roster. You must open the setup web pages in a browser such as Safari or Chrome by typing the IP Address of your WFD-60 into the browser. If you are in home net mode you use the IP Address assigned by your router. Select the Locomotive Roster page and proceed as described.

To download all or part of a roster, click Download Roster on the WFD-60 Locomotive Roster page. The page of the roster that you are currently displaying has no effect. The Roster Download page will appear as in Figure 44.

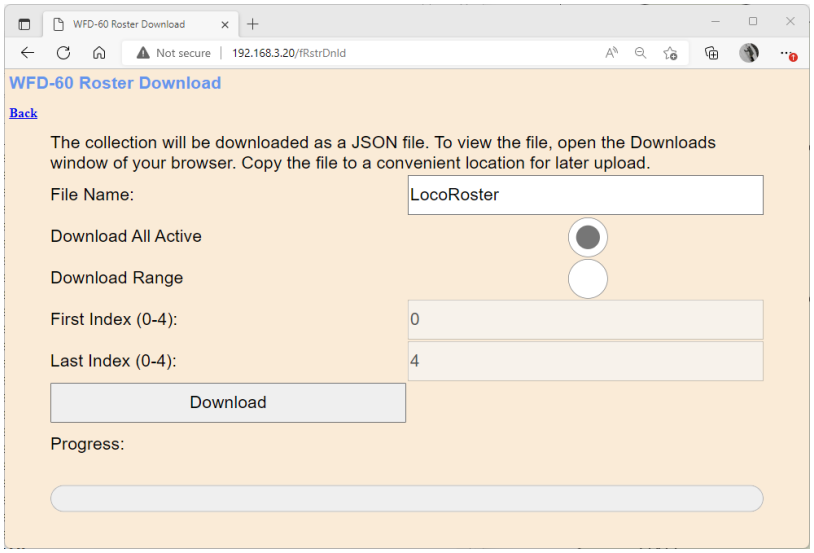


Figure 44 The Roster Download Page

There are 100 indices in the roster. Usually only some have been filled and are therefore active, so only active roster entries will be downloaded.

The File Name is the name you want to give to the file that will be downloaded, so give it a meaningful name that you will recognize.

You can elect to include all of the active loco entries in the file or just a range. Therefore select “Download all Active” or “Download Range” accordingly.

If you select “Download Range” enter the First and Last Index as required. For example, if you just want to download the first 10 locos, use 0 and 9 as the values. Notice that indices begin at 0. You may want to go back to the Locomotive Roster page and jot down the first and last index.

Click Download to start. A Progress Bar shows the download progress as in Figure 45.

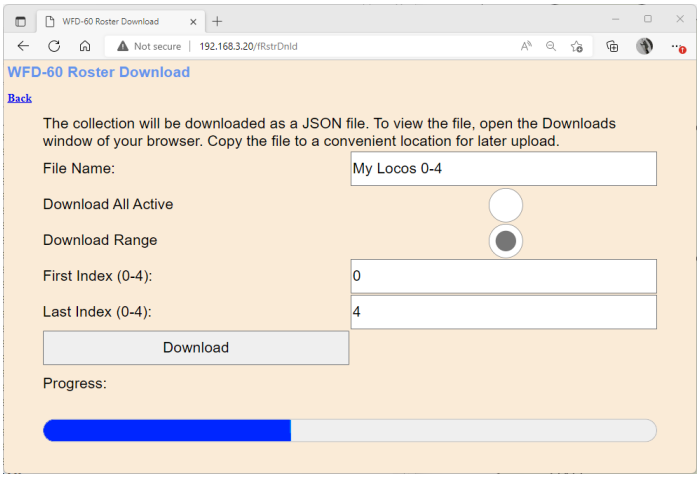


Figure 45 A Download in Progress

When the download is complete, the action depends on the browser and device you are using.

Accessing the Roster Download File on Windows 10

Using Microsoft Edge on Windows 10 or 11, the browser automatically opens the Downloads pane as on the right of Figure 46.

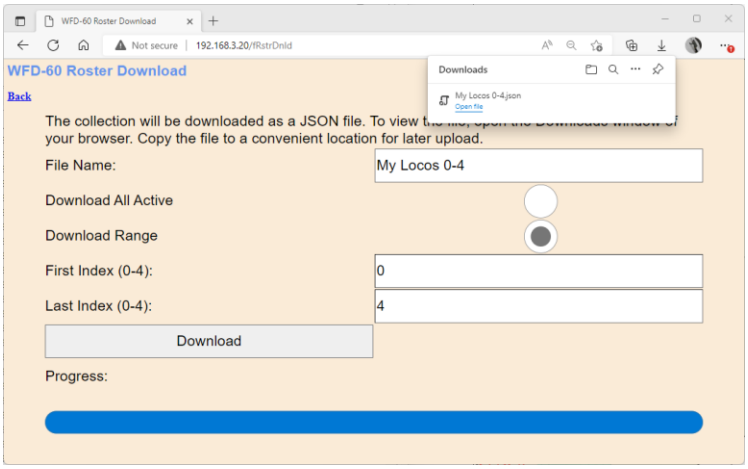


Figure 46 Download Complete on Windows using Edge Browser

This behavior is the same as downloading any file from the internet. The file is placed in the Downloads folder for the account on your machine. How you access this will depend on your device and operating system.

On Windows 10 this will be

`C:\Users\<User Name>\Downloads`

Where <User Name> is the name of the Windows user account on your machine. You can open the Downloads folder in Edge by clicking on the folder icon in the Downloads pane in Figure 46 to see the folder in Windows Explorer as in Figure 47.

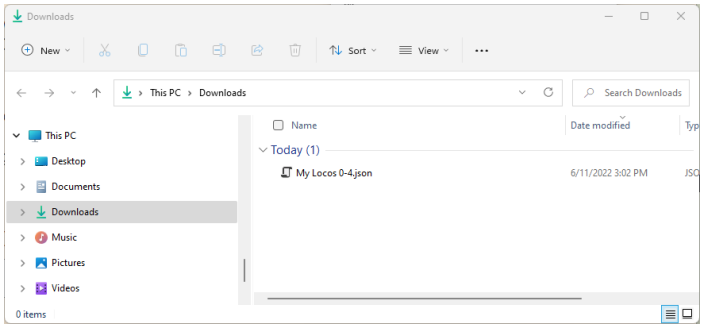


Figure 47 The Downloaded Roster File in Windows Explorer

Now you should copy the file to a suitable location on your computer that you have prepared for rosters. If you leave it in the Download folder if will get lost if you delete the downloads to clear up space on your disk drive.

For the technically inclined, the file is in JSON format and contains locos as JSON objects with 29 function definitions as an array of sub-objects. A section of the file is shown in Figure 48. It is possible to carefully modify this manually, but be careful, as uploading an invalid file may crash the firmware in the WFD-60 and require a factory reset.

Figure 48 A loco entry in a JSON Roster File

Accessing the Roster Download File on Apple IOS

On Apple IOS, for example an iPad, Safari puts up a dialog “Do you want to download “My Locos 0-4.json.txt” for this example. When you tap Download, it places the file in the Downloads folder which you can open by tapping the little Downloads Icon at the top (a down arrow with a circle) followed by the Magnifying Glass Icon. Alternately you can open the Files app and tap Downloads.

You can create a Rosters folder either on the iCloud drive or locally and move the downloaded file to that location.

Accessing the Roster Download File on Android

On Android, after the download completes, you are given the option to open the file. You don’t really want to do that, you need to store the file in your desired location, so tap the “three dots” to get the menu on Chrome and tap Downloads to open the Downloads folder. You can use the File Manager app to copy the file from Downloads to a new folder called Roster which you can create in Main Storage.

Different versions of the Google operating system Android may work differently. Study the features of your device to find the best approach to storing your roster files.

Uploading a Previously Downloaded Locos File

IMPORTANT: On the Engine Driver and WiThrottle apps, you cannot use the Web display within that app to download or upload a locomotive roster. You must open the setup web pages in a browser such as Safari, Chrome or Edge by typing the IP Address of your module into the browser. If you are in home net mode you use the IP Address assigned by your router. Select the Locomotive Roster page and proceed as described.

To upload a previously saved set of locos go to the Locomotive Roster page and click the Upload link. On the Roster Upload page, click the Choose File button and navigate to your saved locos file as in Figure 49. Click Open. The chosen file name should show against the Choose File button as in Figure 50. To complete the upload, click the Upload button.

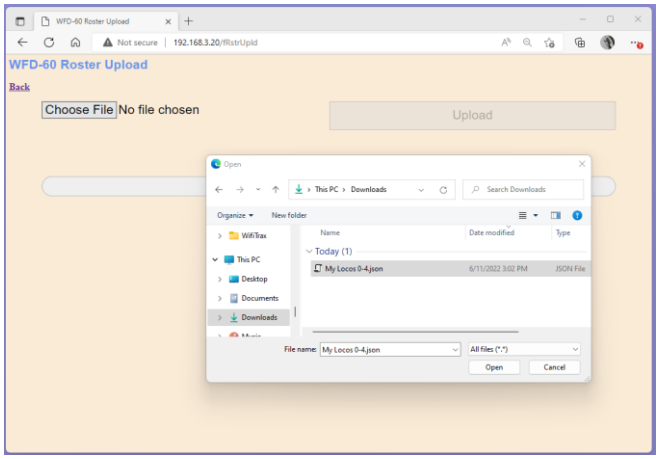


Figure 49 Opening a Previously Saved Locomotives File

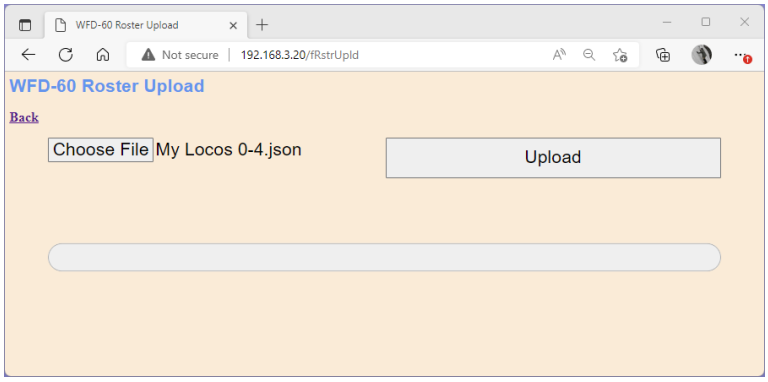


Figure 50 The Chosen File to be Uploaded is Displayed

The progress bar shows upload progress. When complete, the Locomotive Roster page is displayed showing the newly uploaded locomotives.

Note that uploading is controlled by the indices assigned to locomotives (i.e., location numbers in the loco roster), that are stored in the file. If locos already exist at those locations in the list within the WFD-60, they will be overwritten. If they do not exist, they will be created. If you upload several files that have sets of locos with gaps between indices either within a file or between files, locos will appear in the WFD-60 list with those exact same indices. So, there may be gaps in the list. This does

not matter but, if you add locos, you will fill the gaps. You can also move the locos up or down and save the whole file again.

Uploading a Locomotive from a JMRI Export

IMPORTANT: On the Engine Driver and WiThrottle apps, you cannot use the Web display within the app to download or upload a locomotive roster. You must open the setup web pages in a browser such as Safari or Chrome by typing 192.168.7.1 into the browser. If you are in home net mode you use the IP Address assigned by your router. Select the Locomotive Roster page and proceed as described.

If you have used Java Model Railroad Interface (JMRI) to run your locomotives and have defined a number of locos within JMRI, you can export each loco to a file from within JMRI Decoder Pro. These files are in XML form and contain a definition of things like the Name, DCC Address, Function Names and Decoder CV Values.

WFD-60 has the capability to upload a JMRI Export File such as this and use it to define a locomotive in the roster with the corresponding Name, DCC Address and Function Names. WFD-60 does not, at present, allow programming of DCC Configuration Variables (CV's) from the JMRI file.

To transfer your locomotives from JMRI to WFD-60 using this process, first export one of your locomotives into an XML file such as that shown in Figure 51, which contains locomotive details and function labelling.

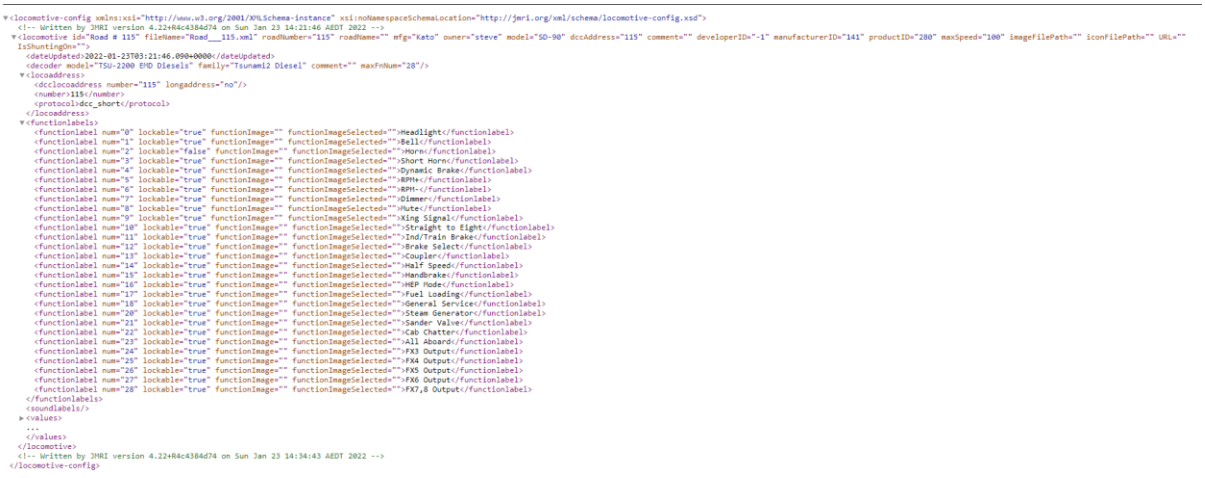


Figure 51 A Locomotive File in XML Exported from JMRI

The file in Figure 51 is displayed in Microsoft Edge and actually contains the CV Values as well under the <values> tag which is shown closed in Edge. That section is ignored by the JMRI Upload in the current version of WFD-60 firmware.

Once you have an XML file from JMRI containing your locomotive's details, open the Locomotive Roster page from the main menu, then click on the JMRI Upload Roster hyperlink. This displays the JMRI File Upload page as Figure 52.

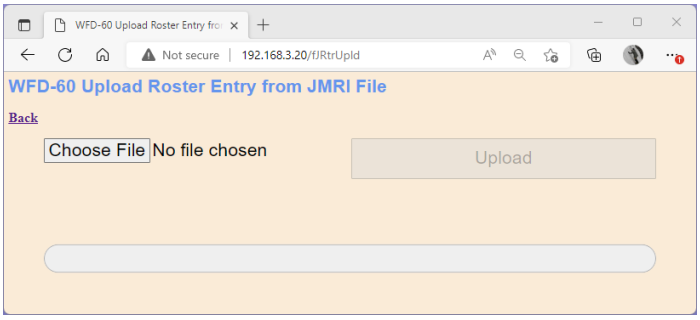


Figure 52 Uploading a Locomotive Roster Entry from a JMRI Export File

Use the Choose File button to select the JMRI Loco Export file as Figure 53. Click the Open button on the File Select dialog. Then click the Upload button on the Upload Roster Entry page as Figure 54.

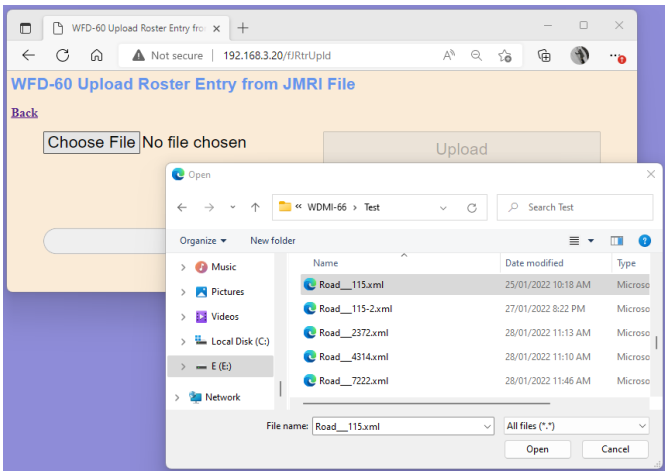


Figure 53 Choosing a JMRI Locomotive Export File

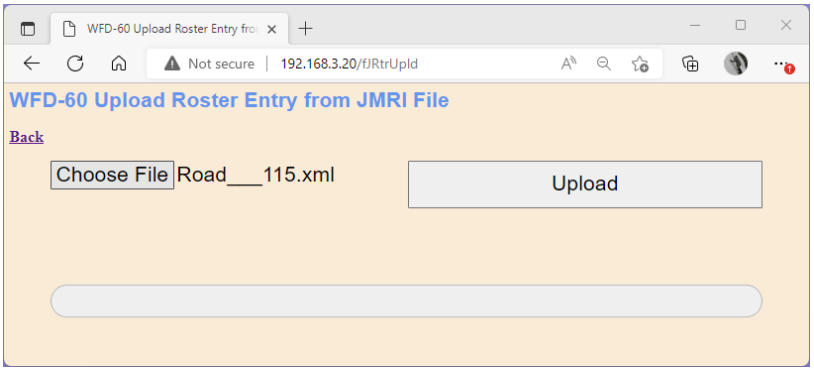


Figure 54 Click the Upload Button, once the file is Selected

The upload proceeds and a new locomotive is created in the roster as Figure 55.

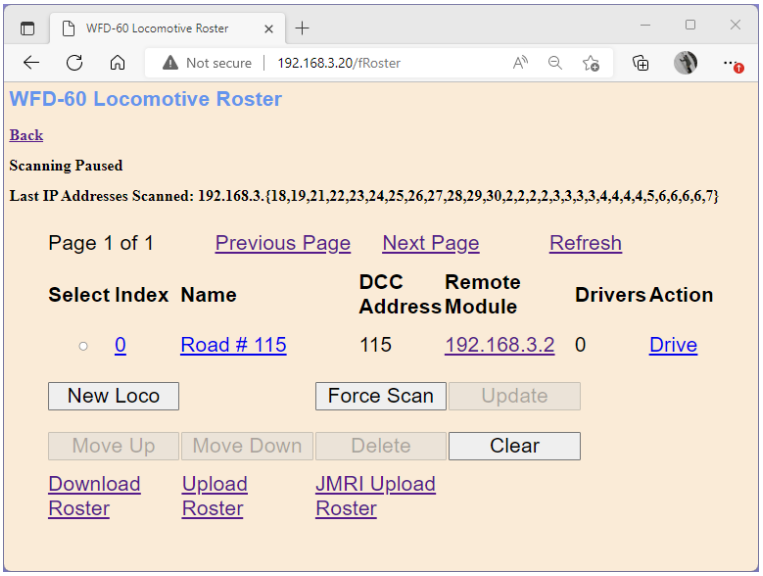


Figure 55 A new JMRI Loco has been Uploaded

Driving a Loco from the Roster Page

The drive page sourced from each module installed in a loco, such as WDMI-32 or WDMI-27, offers an alternative to allow a loco to be driven from a smart phone, tablet or computer without installing one of the apps in Table 1.

You can open the Drive page for a particular locomotive in the roster by clicking the Drive hyperlink on the right of any entry in the WFD-60 Locomotive Roster page. Tapping this link will open a new tab in your browser showing the Drive page for that loco as in Figure 56.

Note that the browser screen has now gone to the locomotive module and has left the WFD-60. The WFD-60 was just used as a directory to get to the loco itself. When you have finished driving the locomotive, close that browser tab, leaving the WFD-60 tab still open.

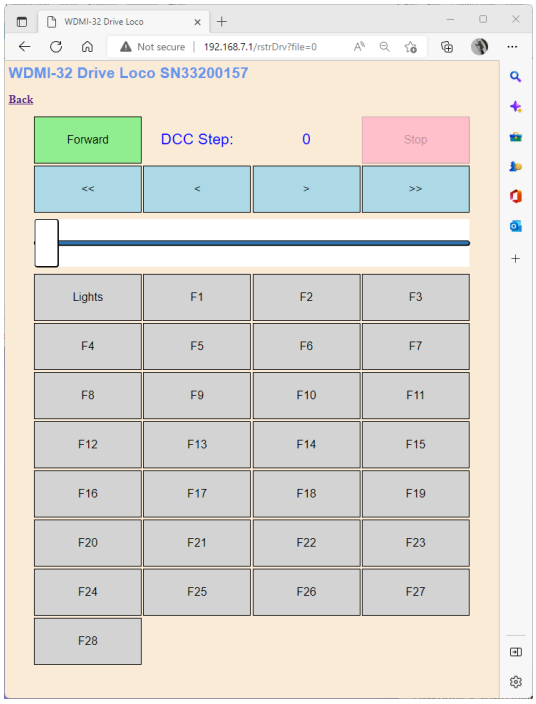


Figure 56 The Drive Page for Web Browser Driving

Tap Forward to toggle the direction.

Use the slider to control the speed. Alternatively tap >> to increase the speed by ten DCC steps or > to increase by just one step. Tap << to reduce the speed by ten DCC steps or < to reduce the speed by one DCC step.

Tap any of the function buttons to change their value.

Actually, you will probably get a better experience using the WiThrottle app, Engine Driver app or the TCS UWT-100, so please do explore those options.

However, you can always come back to these web pages on any device with a browser. Remember to connect to the module's network first.

Accessing Locomotive Module Web Pages from the WFD-60

This feature of using the WFD-60 as a directory also gives access to all of the Web Pages of each Locomotive Module included in the roster. Simply click on the IP Address in the column headed "Remote Module" to open a new browser tab showing the Main Menu for that module.

Accessories

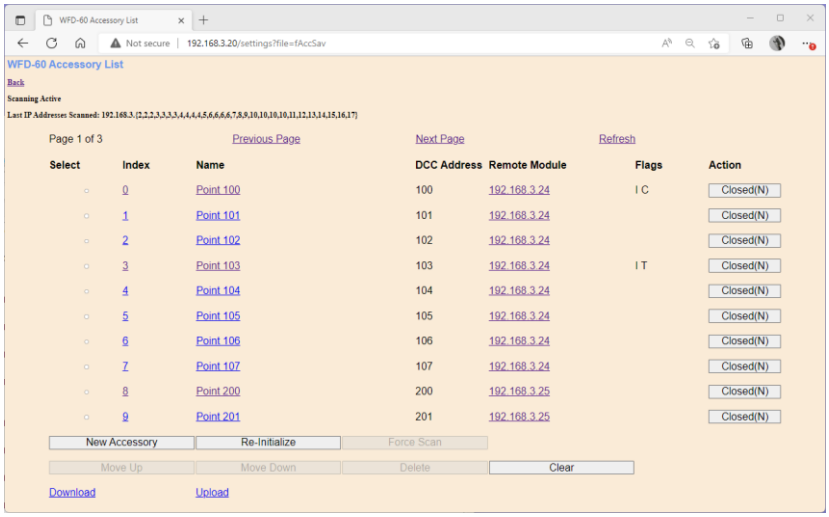


Figure 57 The Accessory List Page

The Accessories List Page in Figure 57 shows the Accessories (usually point motors or switch machines but we'll call them accessories) fitted with Wifitrax modules on your home net that are available to operate from the WFD-60 and its client devices. This is its Accessories List. This list will be delivered to a WiThrottle Protocol app such as Android Engine Driver or Apple WiThrottle or a device such as UWT-100. The list on those devices will appear in the same order as displayed on this page.

Each entry in the Accessory List shows the Index, the Name, the DCC Accessory Address, the IP Address and a set of flags. The flag "I" means the accessory is initialized on power-up, "C" means it is initialized to closed, "T" means it is initialized to Thrown and "R" means the DCC Input Control Sense is reversed.

The accessory list is populated in two ways:

(1) By the WFD-60 Scanning Process. The WFD-60 automatically scans a range of IP Addresses on your home network between the bounds defined in the Settings page as First Scan Address and Last Scan Address. The scanning process only occurs if the Rail Mesh Scanning Enabled checkbox is checked or if you initiate a forced scan. Scanning is enabled by default after leaving the factory and after a factory reset. By default, the First Scan Address is set to 2 and the last is set to 30. If you have many computers or devices on your home network, you might need to extend this.

(2) By adding Accessories manually. The New Accessory button on the Accessories List page will add a new accessory to the roster. The new accessory, in Figure 59, will have default values which will not normally represent an accessory on your layout, so you will have to define the settings manually as in Figure 60.

Up to 200 Accessories can be recorded in the Accessories List and entries are indexed from zero to 199. The index value defines the position in the list and list entries displayed on the Accessories List Page in Figure 57 are paged with ten entries per page, the Previous Page and Next Page hyperlinks enabling access to the required page.

All entries must have a unique DCC Accessory Address which is used to identify an entry in the list. When a new accessory is added, it will be placed in the next available index position and receive, by default, the lowest available unique DCC Accessory Address.

How Accessories are Added to the List by Scanning

Scanning takes place as soon as the WFD-60 connects to your home network, provided the Rail Mesh Scanning Enabled checkbox is checked as in Figure 32. Beginning at the First Scan Address, the module will try to detect a Wifitrax module at each address in turn, by sending a message, until it reaches the Last Scan Address, then it will begin again at the First Scan Address and repeat.

Scanning will be paused if a locomotive is being driven using the WiThrottle interface, with the Engine Driver or WiThrottle app or the UWT-100. It will also be paused when a loco is being driven through the DCC Interface from a DCC Command Station. You can use the Force Scan button to cause a single scan of the first-to-last range of addresses when scanning is paused.

Each time a Wifitrax module such as WFS-47 or WFS-87, responds to the scanning message, the WFD-60 will add the Accessory Channels to the list at the lowest available index positions. The name of each of the accessories will be set to the name of the channel as defined in its Switch Machine Channels page. The DCC address will be the value defined in the same page for that channel. So, for the first accessory in Figure 57, the channel name was set to “Point 100” and the DCC Address was set to 100 in the switch machine controller module and the channel was one of a set from the module found at IP Address 192.168.3.24.

The status of the scanning process is displayed at the top of the Accessories List page as Figure 58. Scanning is shown as Active or Paused, then under that, a list of the last IP Addresses scanned appears. For brevity, the first three digits of the IP Address Subnet are shown only once and then the last IP Addresses within the subnet scanned up to approximately the 30 most recent. So, in the example, the IP Addresses recently scanned are 192.168.3.10, 192.168.3.10, 192.168.3.10, 192.168.3.11, 192.168.3.12, 192.168.3.13, 192.168.3.14 and so on. Notice that 192.168.3.10 was scanned three times, these three retrieved function label information for a loco. Both loco and accessory scanning is shown in the status since they are essentially the same process.

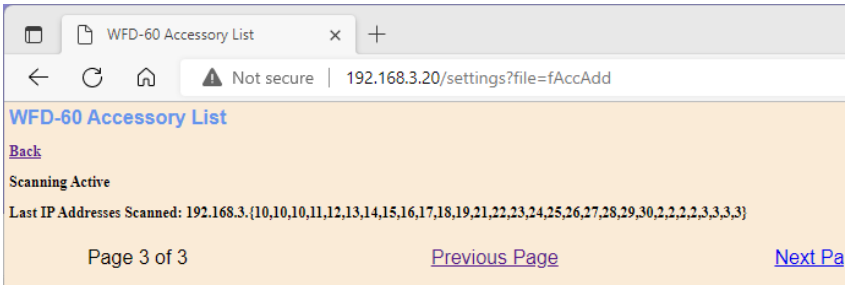


Figure 58 The Scanning Status Shown on the Accessories List Page

Adding a New Accessory Manually

To add an accessory manually, click the New Accessory button and a default accessory will be added. Before this will be of any use, the details must be edited to correspond to a channel of a Switch Machine Controller such as WFS-47 or 87 on your home net with the correct DCC Address, IP Address and Channel.

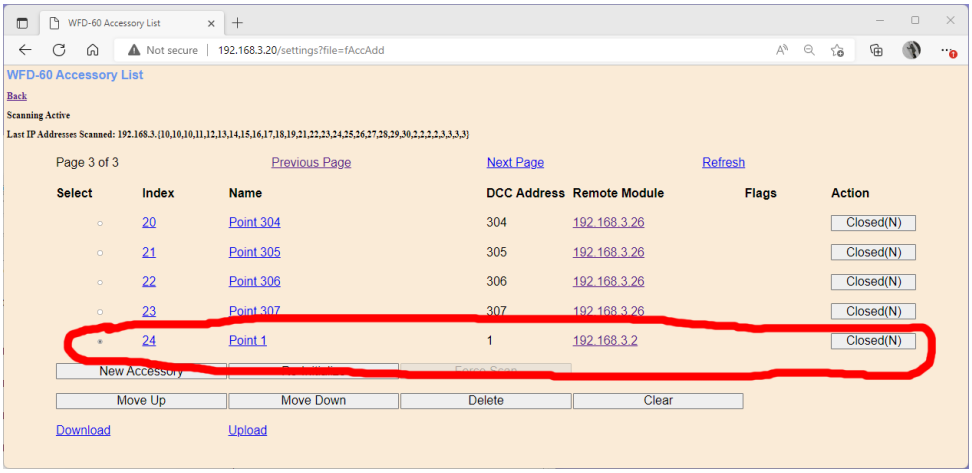


Figure 59 The Accessories List Page after the New Accessory Button is Clicked.

Usually, accessories will be added manually when the Wifitrax controller module (such as WFS-47 or 87) has already been joined to the home net and an IP Address Reservation allocated to it in the router (see the section “Tips to Manage your Home Network”). Advanced users of the WFD-60 and its supported modules may prefer this rather than scanning, whereas first-time users will probably rely on scanning.

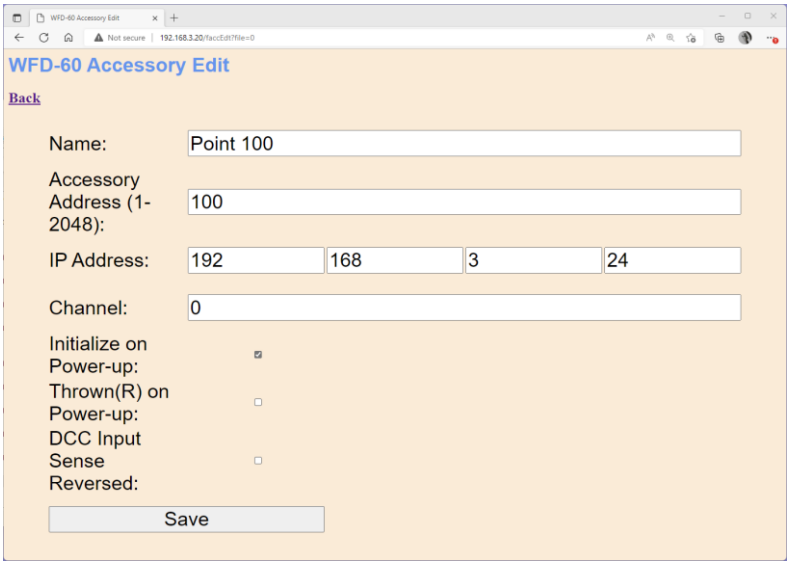


Figure 60 The Accessory Edit Page. Setting the Properties of a New Accessory to Useful Values.

Clicking the hyperlink on Figure 59 formed by the index or the name of the Accessory, will open the Accessory Edit page in Figure 60. Do not click the Remote Module hyperlink at this time.

- Enter a name, up to 10 characters long.
- Type the correct DCC Accessory Address of the accessory channel, (1 – 2048).
- Type the correct IP Address.
- Type the channel number in the Switch Machine Controller Module controlling the accessory. (The channel number will be 0 to 3 for a WFS-47 and 0 – 7 for a WFS87.)
- Decide if you want the accessory (point) to be initialized on power-up, if so, check the box. If you want the point thrown on power-up check that box, otherwise it will be initialized to closed.

- There is also a feature that enables the DCC input to the module to be interpreted in reverse. By default, DCC Normal means closed and DCC Reversed means thrown. If you check the DCC Sense Reversed checkbox, this interpretation will be reversed. Do not use this just because, you have wired the switch machines the opposite way by mistake. Either change the wiring or use the Reversed option on the WFS-47 or WFS-87 module to correct it.

Finally, click Save to save the values permanently for this entry in the accessory list.

Deleting and Moving Accessories Up or Down

Warning: If you have created Panels with items such as turnouts, lights, buttons, track occupation etc. that refer to a specific accessory in your list, these panel items will reference the accessory with the index specified at that time. Therefore, if you move or delete accessories, you will have to go back and modify the panels, otherwise items referencing those accessories will no longer work.

It is best therefore to establish your list of accessories – move them around as needed – then save them to a file before spending a lot of time creating panels. If the IP Addresses of your accessories change, you can force a new scan via the Force Scan button. For version 2.6.2 and above, the IP Addresses of the accessories in your list will be updated without changing their index.

You can delete an accessory by selecting it using the radio button in the left-hand column and tapping the Delete button. after a warning, Figure 61, the accessory will be deleted. This operation cannot be reversed.

All accessories in the list have an index. This simply indicates the position of the accessory in the list. If you delete an accessory, a gap will occur in the indices. Adding new accessories will fill any gaps in the accessory index sequence before appending new accessories at the bottom.

Display of the accessory list is paged, 10 accessories to a page, so a full list will have 20 pages. Initially, when you enter the Accessory List, the first page will be displayed. Move forward and backwards in the pages by clicking the Next Page and Previous Page links.

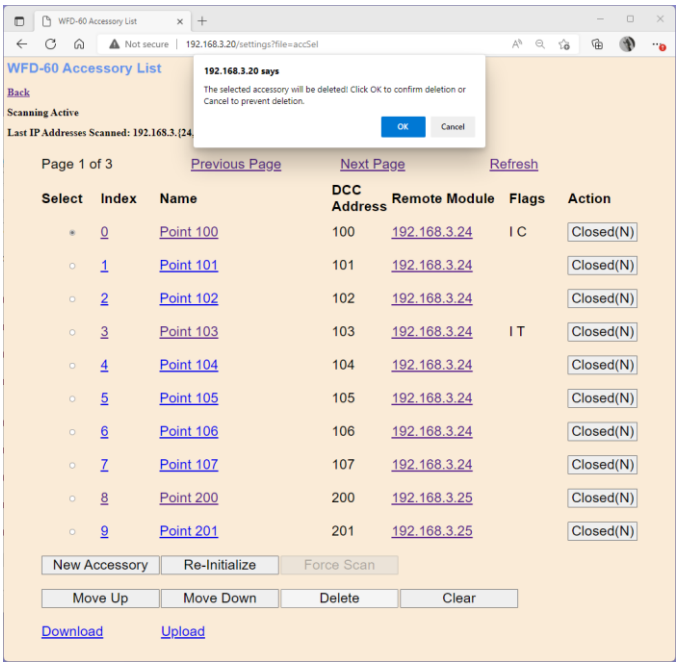


Figure 61 Deleting an accessory from the list

An accessory may be moved upwards and downwards in the list. To move an accessory down by one step, select the required accessory by clicking the radio button at its left. Then click Move Down. The index of the selected accessory will be increased by one so that the accessory will move one place downwards in the list. Similarly, you can move an accessory one place up by selecting and clicking the Move Up button. Note that if you have gaps in the index sequence, accessories will increase or decrease their index as they move through the gap and only appear to move down or up when an adjacent index is occupied.

Clearing the Entire Accessory List

You can clear the entire list and begin again by clicking the Clear button. After a warning, all accessories will be deleted. This operation cannot be reversed. However, if you have downloaded some or all of your accessories you can restore them by uploading the file as described in the Section "Uploading a Previously Downloaded Accessories File".

Accessory Initialization

Accessories can be set to initialize to a particular state on power up of the WFD-60 module. For example, you may wish that every time you turn on your system, all the points are set to the closed state, or perhaps all main-line routes are setup as default.

To cause an accessory to set to a defined state on power up, check the Initialize on Power-up checkbox on the Accessory Edit page. To define the state of the point on power-up either check or leave unchecked the Thrown (R) on Power-up checkbox. Note that in DCC Terminology "Thrown" is normally defined as "Reversed" as would be displayed, for example, on an NCE Power Cab or Pro-Cab.

The third checkbox allows for reversal of the sense of commands sent from a DCC Command Station for the Thrown and Closed settings. Normally Closed = "N" and Thrown = "R". Checking the DCC Input Sense Reversed checkbox reverses this sense which might be useful in some rare situations. Normally leave this unchecked.

Once a set of accessories in the list are set to initialize, they will be set to the states you require each time the WFD-60 is powered up. Back on the Accessory List Page in Figure 57, a button marked Re-initialize will have the same effect when clicked.

Operating Accessories from the Accessories List Page

The buttons on the right in the Accessory List Page in Figure 57 will toggle accessories. The state of the accessory will be shown on the Accessories List Page. The state will also be updated when re-initialization occurs, on power-up and if accessories are changed from a WiThrottle Protocol app or device such as Engine Driver, WiThrottle or TCS UWT-100.

The display will not show the correct state if the web page on a Wifitrax WFS series controller is used to change the state. You can, of course, use WFS-47 and WFS-87 Switch Machine Controllers with your DCC Command Station/Booster, but to be consistent you should try to change them from the same place, either the WFD-60 or the WFS web page. Also, if you use the DCC input of the WFS-60 to control switches, you should not also connect the DCC Command Station to the DCC Input of the WFS-47 or 87, otherwise these modules will receive two commands and the results might be indeterminant.

Downloading Accessories to a File

Once you have set up a set of accessories in your roster, it is a good idea to download and store it in a file on your PC or other device. For example, if you need to reset the module for some reason, the accessory list will return to its default and you will have wasted all that work. You also might like to have separate accessory lists if you use the WFD-60 at a club as well on your own layout.

IMPORTANT: On the Engine Driver and WiThrottle apps, you cannot use the Web display within the app to download or upload an accessory list. You must open the WFD-60 Web Pages in a browser such as Safari or Chrome by typing its IP Address into the browser. If you are in home net mode you use the IP Address assigned by your router. Select the Accessories page and proceed as described.

To download all or part of an accessory list, click Download on the WFD-60 Accessory List page. The page within the list that you are currently displaying has no effect. The Accessories Download page will appear as in Figure 44.

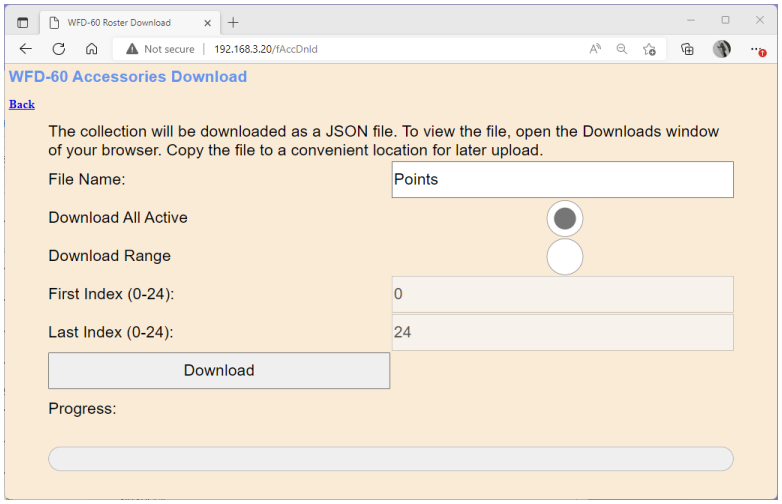


Figure 62 The Accessories Download Page

There are 200 indices (accessory index numbers not DCC Address) in the list. Usually only some have been filled and are considered active, so only active list entries will be downloaded.

The File Name is the name given to the file that will be downloaded, so give it a meaningful name that you will recognize.

You can elect to include all of the active accessory entries into the file or just a range. Therefore select “Download all Active” or “Download Range” accordingly.

If you select “Download Range” enter the First and Last Index as required. For example, if you just want to download the first 10 accessories, use 0 and 9 as the values. Notice that indices begin at 0. You may want to go back to the Accessory List page and jot down the first and last index.

Click the Download button to start the download. A Progress Bar shows the download progress as in Figure 63.

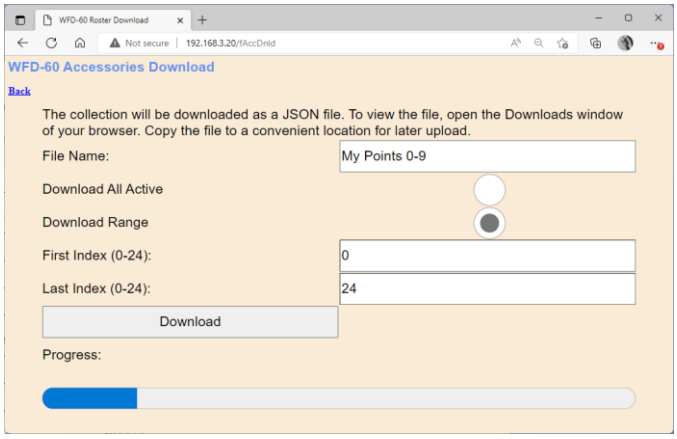


Figure 63 Accessory Download in Progress

When the download is complete, the action depends on the browser and device you are using.

Accessing the Accessory Download File on Windows 10

Using Microsoft Edge on Windows 10, the browser automatically opens the Downloads pane as on the right of Figure 64.

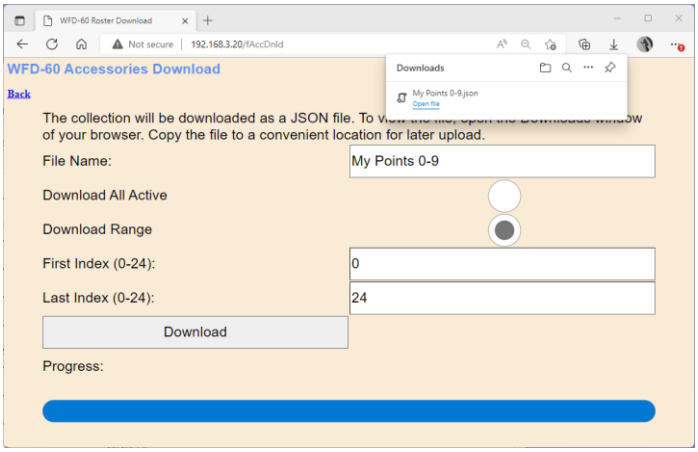


Figure 64 Accessory Download Complete on Windows using Edge Browser

This behavior is the same as downloading any file from the internet. The file is placed in the Downloads folder for the account on your machine. How you access this will depend on your device and operating system.

On Windows 10 this will be

`C:\Users\<User Name>\Downloads`

Where <User Name> is the name of the Windows user account on your machine. You can open the Downloads folder in Edge by clicking on the folder icon in the Downloads pane to see the folder in Windows Explorer as in Figure 47.

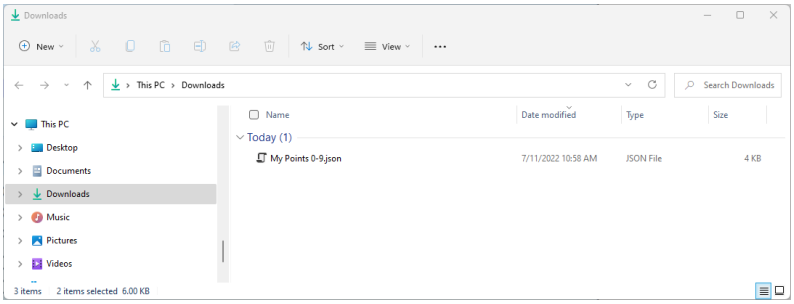


Figure 65 The Downloaded Roster File in Windows Explorer

Now you should copy the file to a suitable location on your computer that you have prepared for rosters. If you leave it in the Download folder if will get lost if you delete the downloads to clear up space on your disk drive.

For the technically inclined, the file is in JSON format and contains locos as JSON objects. A section of the file is shown in Figure 66. It is possible to carefully modify this manually, but be careful, as uploading an invalid file may crash the firmware in the WFD-60 and require a factory reset.

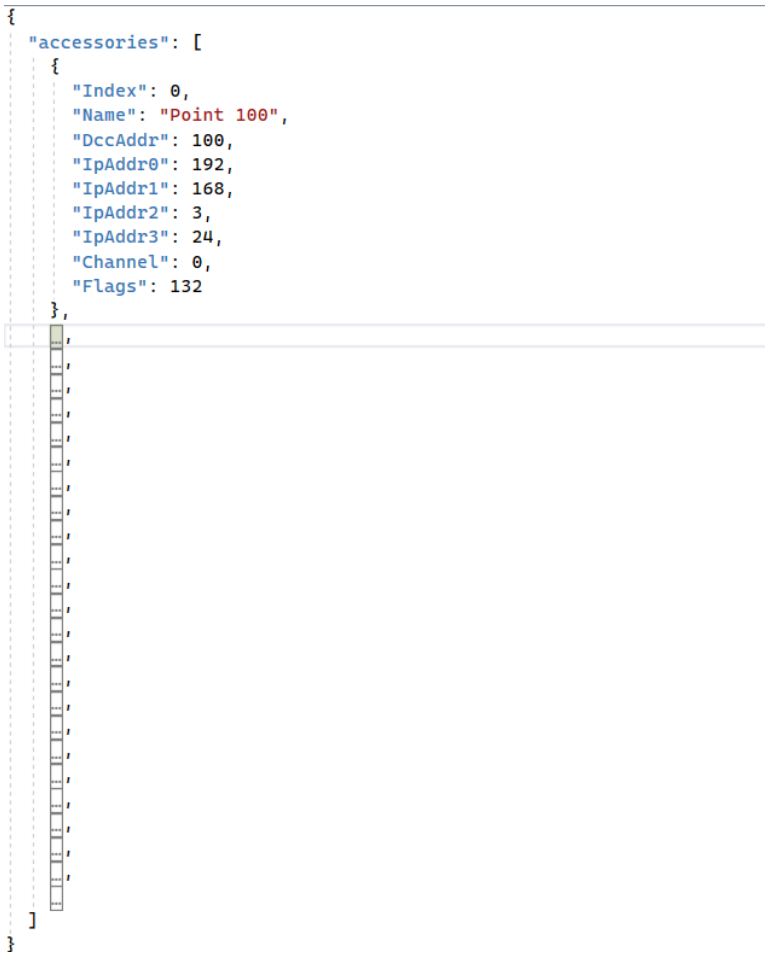


Figure 66 Accessory Entry in a JSON Accessory List File

Accessing the Accessory Download File on Apple IOS

On Apple IOS, for example an iPad, Safari puts up a dialog “Do you want to download “My Points 0-9.json.txt”. When you tap Download, it places the file in the Downloads folder which you can open

by tapping the little Downloads Icon at the top (a down arrow with a circle) followed by the Magnifying Glass Icon. Alternately you can open the Files app and tap Downloads.

You can create an Accessories folder either on the iCloud drive or locally and move the downloaded file to that location.

Accessing the Accessory Download File on Android

On Android, after the download completes, you are given the option to open the file. You don't really want to do that, you need to store the file in your desired location, so tap the "three dots" to get the menu on Chrome and tap Downloads to open the Downloads folder. You can use the File Manager app to copy the file from Downloads to a new folder called Accessories which you create in Main Storage.

Different versions of the Google operating system Android may work differently. Study the features of your device to find the best approach to storing your roster files.

Uploading a Previously Downloaded Accessories File

To upload a previously save set of accessories go to the Accessories List page and click the Upload link. On the Accessories Upload page, click the Choose File button and navigate to your saved accessories file. Click Open. The chosen file name should show against the Choose File button as in Figure 68. To complete the upload, click the Upload button.

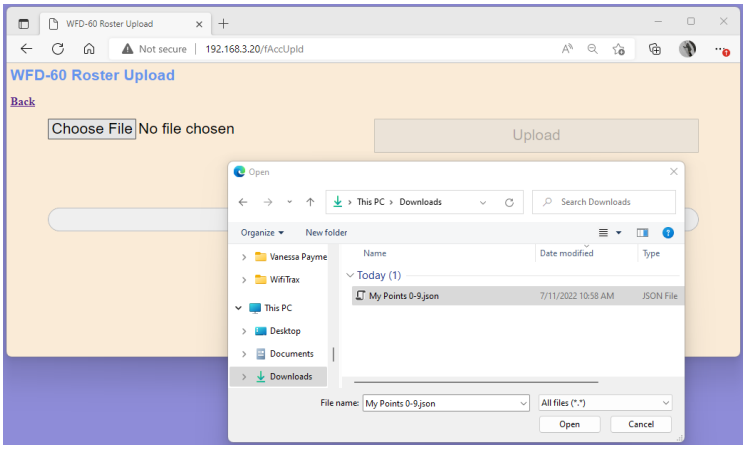


Figure 67 Opening a Previously Saved Accessories File

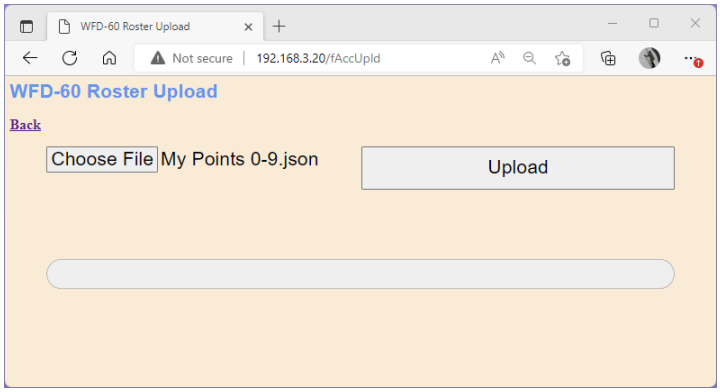


Figure 68 The Chosen File to be Uploaded is Displayed

The progress bar shows upload progress. When complete, the Accessories List page is displayed showing the newly uploaded accessories.

Note that uploading is controlled by the indices assigned to accessories (i.e., location numbers in the accessory list), that are stored in the file. If accessories already exist at those locations in the list within the WFD-60, they will be overwritten. If they do not exist, they will be created. If you upload several files that have sets of accessories with gaps between indices either within a file or between files, accessories will appear in the WFD-60 list with those exact same indices. So, there may be gaps in the list. This does not matter but, if you add accessories, you will fill the gaps. You can also move the accessories up or down and save the whole file again.

Accessory Modules

This section applies to versions 2.6.0 and above.

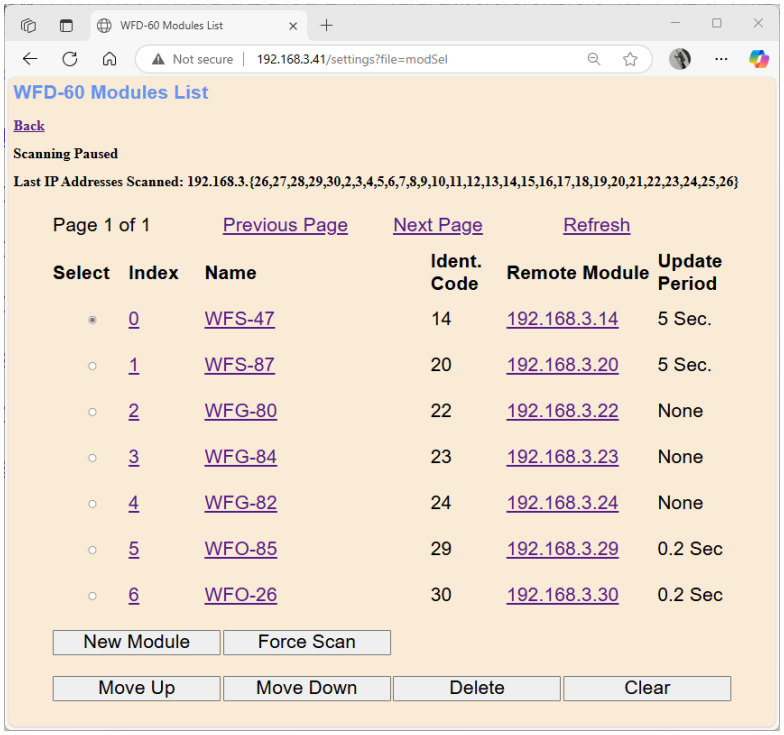


Figure 69 The Accessory Modules Screen

Accessory Modules are Wifitrax modules that provide channels to control or monitor accessories. Examples are shown in Figure 69, and include Switch Machine Controllers such as WFS-47 or WFS-87, General Purpose Light Controllers such as WFG-82 or WFG84, and Track Occupation Controllers such as WFO-85 and WFO-26. Loco Controllers such as WDMI-27 and WDMI-32 are not included in this category. So what is the difference between this screen and the Remote Accessories screen? The answer is that this screen shows information about each *module* which may contain multiple channels whereas the Remote Accessories screen shows information for each channel. Each channel on the Remote Accessories screen controls or tests a certain accessory whereas the module as a whole is displayed on the Accessory Modules screen, showing only those features common to all channels in the module.

Up to 50 Accessory Modules may be scanned or entered manually and this screen shows them in pages of 10 per page. The first column is a selection box. Each module has an index from 0 to 49, shown in the second column and a name shown in the third column. The fourth column shows a

unique identity code, and the fifth, the IP Address. The last column shows the update period for status scanning.

If the update period is set to None, the default value, the module is not included in status scanning. Thus, for example, if the module is a switch machine controller such as WFS-87 and is included in a Panel, the panel would only be updated if the Thrown/Clear setting was updated from this WFD-60. In this case, the switch machine channel could be changed using its manual button, its DCC Input, its own Web Page, or indeed another WFD-60 and the Panel display for this WFD-60 would not be updated.

If the update period is set to any of the other values (5 Sec., 2 Sec., 1 Sec., 0.5 Sec. or 0.2 Sec), the controller will be polled regularly with that interval to determine the state of all its channels and displays such as panels will be updated accordingly.

The properties of each Accessory Controller entry can be modified by clicking on the Index or Name to display the Module Edit page. Clicking on the IP Address shown in the Remote Module column will open a new browser tab showing that module's main menu.

The list of Accessory Modules is populated in two ways:

(1) By the WFD-60 Scanning Process. The WFD-60 automatically scans a range of IP Addresses on your home network between the bounds defined in the Settings page as First Scan Address and Last Scan Address. The scanning process only occurs if the Rail Mesh Scanning Enabled checkbox is checked, or if you have clicked the Force Scan button when it will occur just once. Scanning is enabled by default after leaving the factory and after a factory reset. By default, the First Scan Address is set to 2 and the last is set to 30. If you have many computers or devices on your home network, you might need to extend this.
When an Accessory Module is discovered by scanning, Remote Accessory Entries added to the WFD-60 and will appear on the Remote Accessories page – one for each channel. On the Accessory Module page being described here however, only one entry will be added for each module discovered, no matter how many channels.
The default properties of the new Accessory Module entry will be:
    a. Index = next available value
    b. Name = the name of the product discovered, e.g. WFS-87, WFO85)
    c. Ident Code = last number in the IP Address, e.g. for 192.168.3.23, Ident Code is 23
    d. Remote Module = Full IP Address of the discovered module
    e. Update Period = None

    You can edit the Accessory Module entry to change any of these.

(2) By adding locomotives manually. The New Module button on the Accessory Module page will add a new Module to the collection. The new Module, will have default values which will not normally represent a physical module on your layout, so you will have to define the settings manually as in Figure 40

(3) By uploading a set of Accessories that have previously been downloaded to a file. As the accessories are uploaded, a default Accessory Module will be created if it is not already present.

Editing the Properties of an Accessory Module

This section applies to versions 2.6.0 and above.

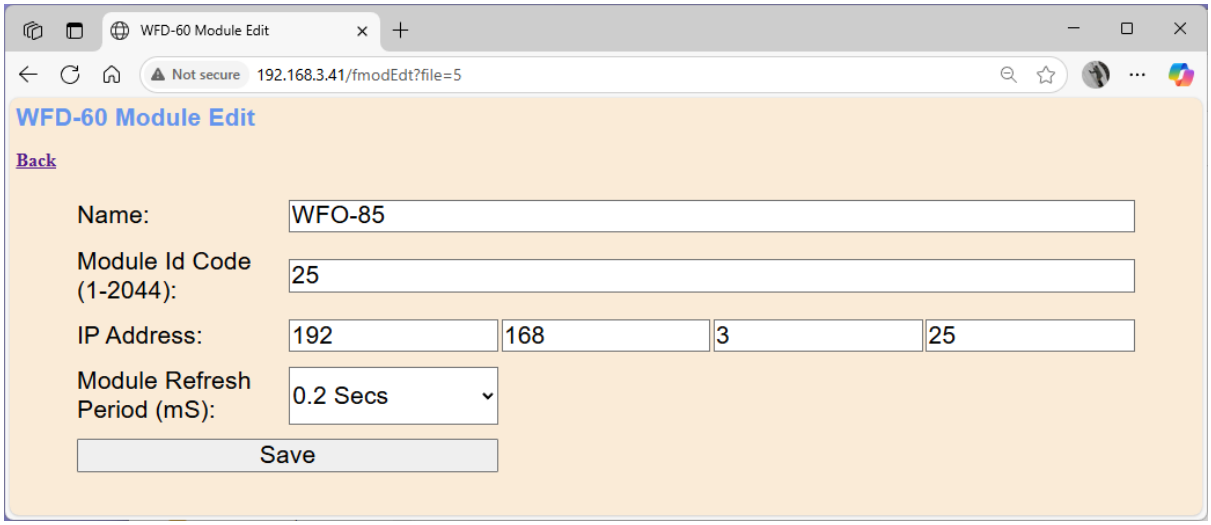


Figure 70 The Accessory Module Edit Page

You can modify the values applicable to an Accessory Module in the screen shown in Figure 70. The name defaults to the name of the product found. You can change this to anything between 1 and 15 characters.

The Module ID code is a unique identifier for the module and is always equal to the last digit of its IP Address. You cannot change this.

The IP Address can be changed, so if you know the true IP Address of your module, you can alter this to match. It is only really relevant when entering Accessory Modules and Accessories manually.

The last entry on this screen is the Module Refresh Period which can be set to a range of values from None, 5 Seconds, 2 Seconds, 1 Second 0.5 Second and to 0.2 Seconds. This is the period between polls to the module by the WFD-60 to check the status of all its channels. For example, for a module such as the WFO-85, the module will return the occupation status of each of its 8 channels, true/false, which will change as locomotives travel through the blocks under its surveillance. A switch machine controller such as the WFS-87 will return the status of each of its channels as thrown/closed.

Some modules only change their status when commanded by the WFD-60 Layout Controller, whereas others change independently and it is important to poll the status so that information on WFD-60 Panels can be updated. This is the case with track occupation sensors. Even modules such as Switch Machine Controllers may change due to local action by their push buttons, local web pages, or a second WFD-60 and therefore it may be necessary to poll those also – probably at a longer period such as 2 or 5 seconds.

Regardless of the settings of the Module Refresh Period on this screen, polling only takes place when it is enabled by checking the “Accessory Status Scanning Enabled” checkbox on the WFD-60 Settings screen. You cannot do this when continuous scanning is enabled.

Deleting and Moving Modules Up or Down

You can delete a module by selecting it using the radio button in the left-hand column and tapping the Delete button. after a warning, Figure 71, the module will be deleted. This operation cannot be reversed.

All modules in the list have an index. This simply indicates the position of the module in the list. If you delete a module, a gap will occur in the indices. Adding new modules will fill any gaps in the modules index sequence before appending new modules at the bottom.

Display of the module list is paged, 10 modules to a page, so a full list will have 5 pages. Initially, when you enter the Module List, the first page will be displayed. Move forward and backwards in the pages by clicking the Next Page and Previous Page links.

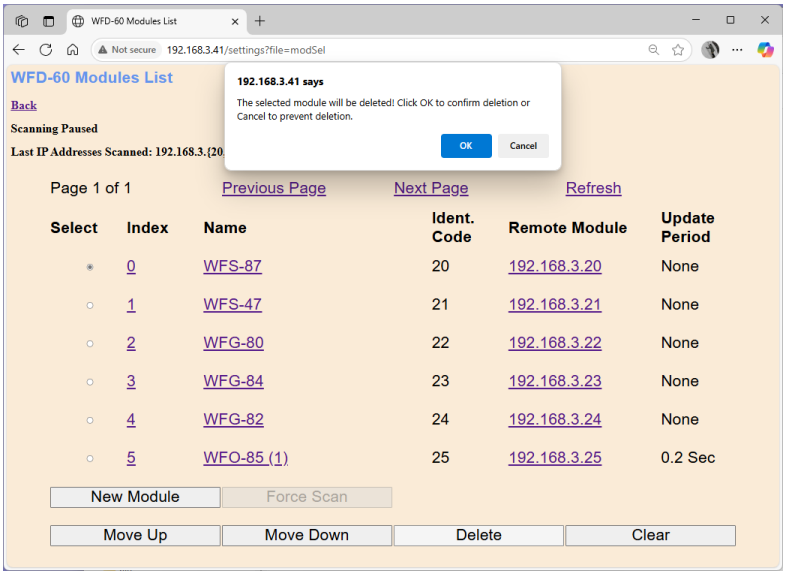


Figure 71 Deleting an accessory module from the list

A module may be moved upwards and downwards in the list. To move a module down by one step, select the required module by clicking the radio button at its left. Then click Move Down. The index of the selected module will be increased by one so that the module will move one place downwards in the list. Similarly, you can move a module one place up by selecting and clicking the Move Up button. Note that if you have gaps in the index sequence, modules will increase or decrease their index as they move through the gap and only appear to move down or up when an adjacent index is occupied.

Clearing the Entire Module List

You can clear the entire list and begin again by clicking the Clear button. After a warning, all modules will be deleted. This operation cannot be reversed. However, if you have downloaded some or all of your accessories you can restore the associated modules by uploading the accessory file a second time. You can also restore the modules by creating them manually, but of course you must give each one the correct IP Address to match the real module on your layout.

Panels

This section applies to versions 2.2.0 and above.

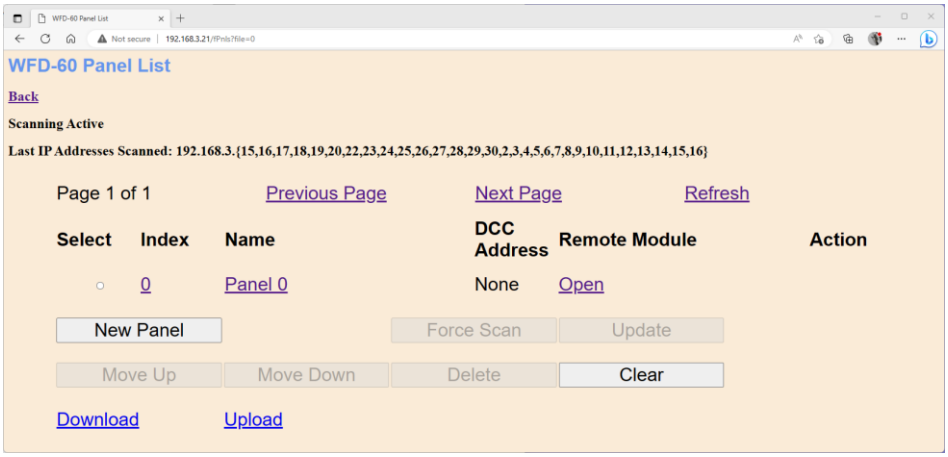


Figure 72 The Panel List Screen

Enter the Panels feature by clicking Panels on the Main Menu. The Panel List is displayed as in Figure 72.

The Panels feature in the WFD-60 allows Schematic panels to be created that can include active features such as turnouts and signals as well as passive features such as track, buildings and labels. Buttons can also be added. The idea is to design a set of diagrams of all or part of your layout, similar to track diagrams in automatic train control centers. You can display these diagrams on any computer, tablet or phone using a web browser. Clicking or tapping on active features such as turnouts or buttons changes the state of those features. Active features map to a physical channel of a device such as a Wifitrax Switch Machine Controller, WFS-47 or WFS-87. These channels (corresponding to physical turnouts on your railway) can be selected for each active feature (turnout or signal) on your diagram.

You can create up to 8 panels in any WFD-60 module. You could have one panel for your entire layout or a set of panels, each covering a section such as a station or yard.

After a reset, one panel is created which you can edit as required by clicking on the hyperlink in the Name column. Once you have completed a panel, you use it by clicking the Open Hyperlink. Remember that you can use your browser features to remember any particular panel in your Favourites collection in your browser. That makes it easier to directly access a panel. You can even select that panel as your browser's home page.

You add more panels by clicking the New Panel button.

Editing Panels

Once you have created a panel, you edit it by clicking its name hyperlink in the Panel List Screen. For a new panel, the screen appears as Figure 73.

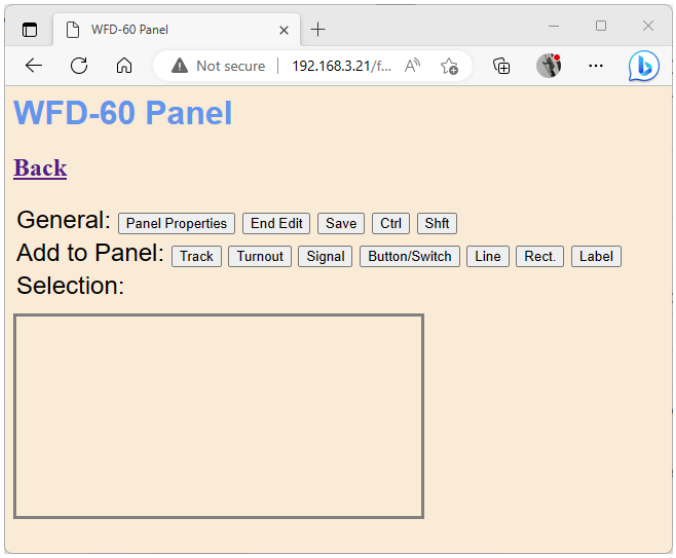


Figure 73 A New Panel Displayed in the Panel Editor

Setting Panel Properties

Perhaps the first thing you will want to do is to give the panel a meaningful name. To do this edit the panel properties by clicking on the Panel Properties button. This shows additional information as Figure 74.

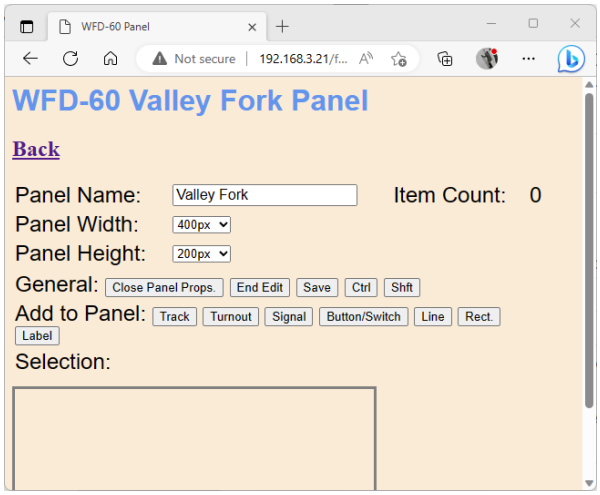


Figure 74 The Panel Properties Information

Type the name you want in the Panel Name textbox such as “Valley Fork” the name of an area on an example railroad. You can also change the size of the panel using the Panel Width and Panel Height dropdowns. Remember to click the Save button. You must always click the Save button before exiting this screen otherwise any changes will be lost.

Once you have set the panel properties, name, width and height you can click the Close Panel Props. button to save some space on your screen.

Adding and Positioning Turnouts

To add an item to your panel, click on one of the buttons in the “Add to Panel” line. The item you add appears in the top-left corner and you can drag it anywhere on the screen. Figure 75 shows two turnouts added. One has been moved to a central position while on remains to be positioned.

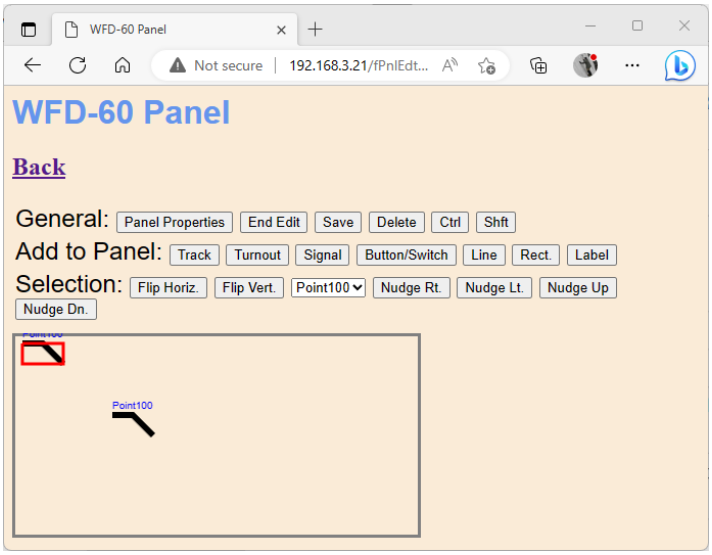


Figure 75 Adding Turnouts to a Panel.

Select a feature by clicking on it. Once you have selected a feature the Selection line appears that contains buttons such as Flip Vert., Flip Horiz., and the Nudge buttons. You can move a feature by dragging and also position it more finely by nudging up, down , left or right. You will find that the three active points on a turnout will snap together and the ends of a track section will snap to one of the three active points on a turnout.

When you select a turnout, you will also see a dropdown that allows you to map it to a channel of an accessory (Switch Machine Control Module) on your layout. These will only appear if either, you have added some accessories manually, or, your WFD-60 has discovered them by scanning your network.

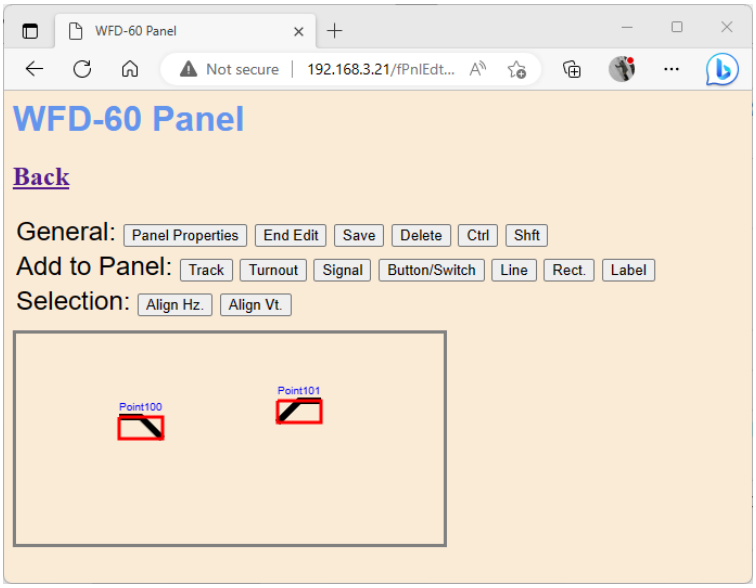


Figure 76 Positioning two turnouts.

Figure 76 shows a situation where we have added and roughly positioned two turnouts. The right hand on has been flipped horizontally and the accessory “Point 101” has been assigned to the symbol. Now we want to better align those turnouts before adding track sections to make a passing siding. You can select both of them by either holding down the control key and clicking one then the

other, or, by dragging across both of them with the mouse holding the left button down. On a tablet, you can click the control button which has the same effect as holding down the control key.

When two or more features are selected, the Selection line buttons show only actions applying to multiple features. Figure 73 shows two actions: Align Vert. and Align Horiz. Align Horiz will set the two turnouts neatly aligned horizontally. You can also move them together by dragging one of them.

Adding Track

Once they are nicely positioned, track can be added by clicking on the Track button. Again, the new feature, a length of track this time, appears in the top-left corner. For track, you can drag the whole length by dragging the middle, or just one end by dragging that end. Roughly these sections are one third of the track length each. Practice dragging the part of the track you want to move. The track ends snap to active points on the turnouts. If you hold down the shift key, the dragged item will only move in the horizontal direction.

Remember to click the Save key frequently. Figure 77 shows the completed sections of track and turnouts.

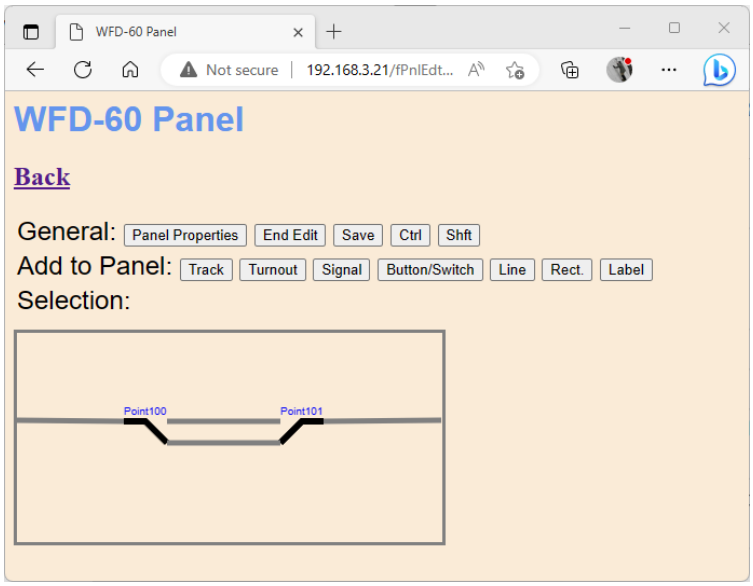


Figure 77 Track Sections added to the Panel

Adding Track Occupation Indication

This section applies only to Version 2.6 and above.

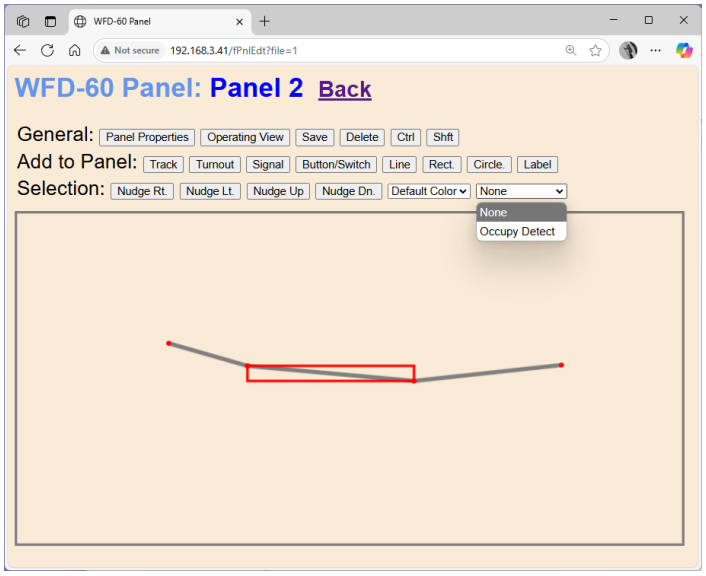


Figure 78 Adding the Track Occupation Feature to a Track Item

Once track has been added, you can select a track item and choose whether or not it will show the result of Occupation Detection, as in Figure 78. Once you have chosen the Occupy Detect option, a drop-down control appears to allow selection of an occupation detection channel of one of your accessory modules. For example, in Figure 79 we are selecting a channel called Occ 1.

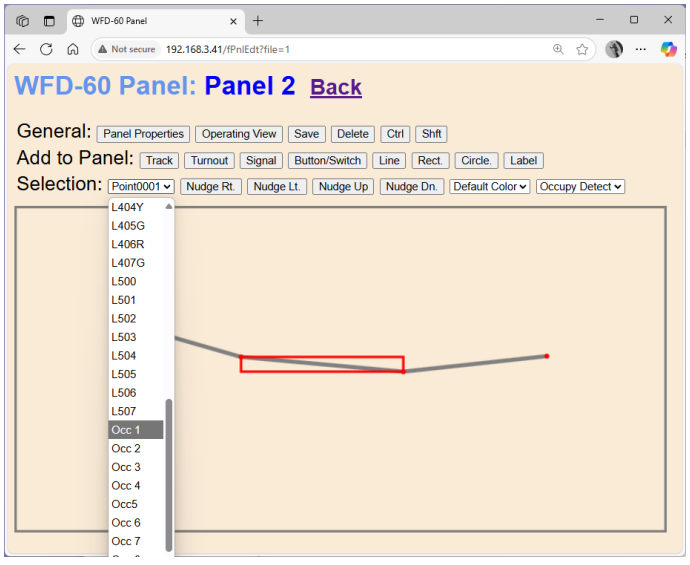


Figure 79 Selecting an Occupation Channel as a Source for Occupation Indication of a Track Item

You could, of course select some other accessory channel like a switch machine control channel in which case the track would show occupied when the switch was thrown, although that may not make any particular sense.

Track items are shown as occupied by being displayed in a color selected as the Track Occupied Color chosen as in Figure 80.

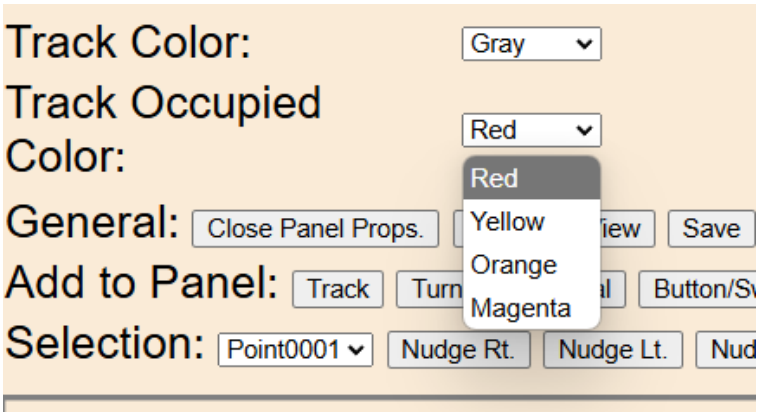


Figure 80 Choosing the Track Occupied Color

Adding Passive Features

Click on Line or Rectangle to add static geometric features to show a platform or building. Rectangles are sized by dragging the top left or bottom-right conners. They are moved by dragging one of the other corners. Click on Label to add text labelling. You can type the text into the textbox displayed as shown. Select the required font size in the dropdown.

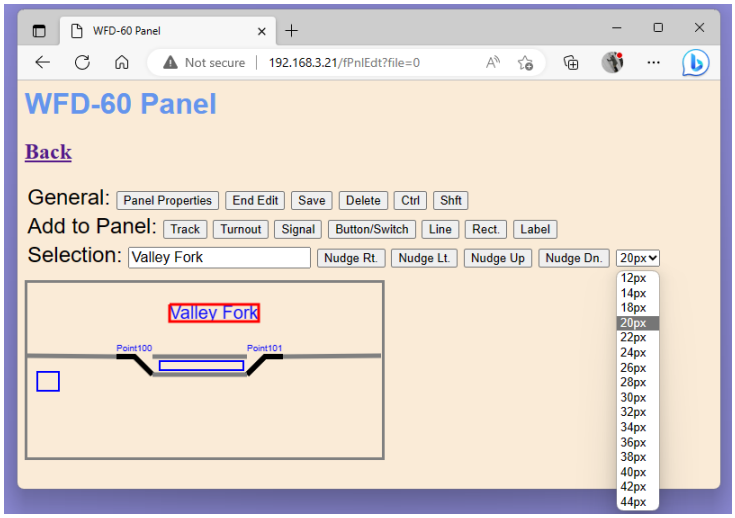


Figure 81 Adding a Label to a Panel

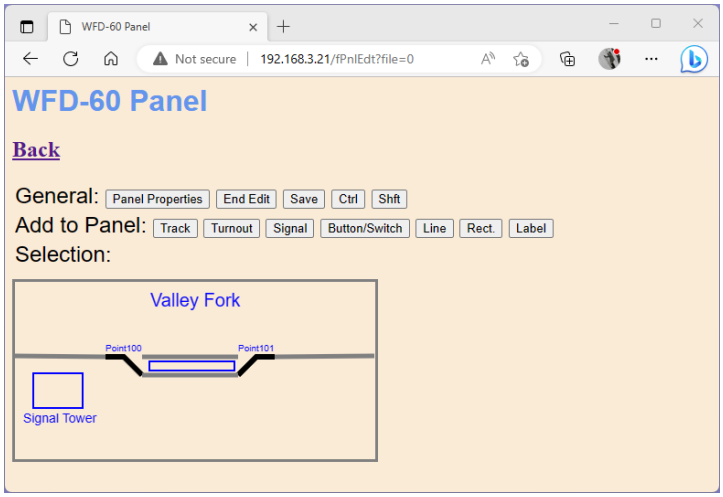


Figure 82 The completed Panel for Valley Fork Station

Operating your Panel

Remember to save your work then click the Back button to return to the Panel List screen. Click the Open hyperlink to operate the panel as in Figure 83. You cannot operate a panel when in edit mode and normally you would not want to since you don't want to accidentally change you panel. You can however be in Edit mode and click End Edit to test Open mode, then you can click Edit to return to Edit mode.

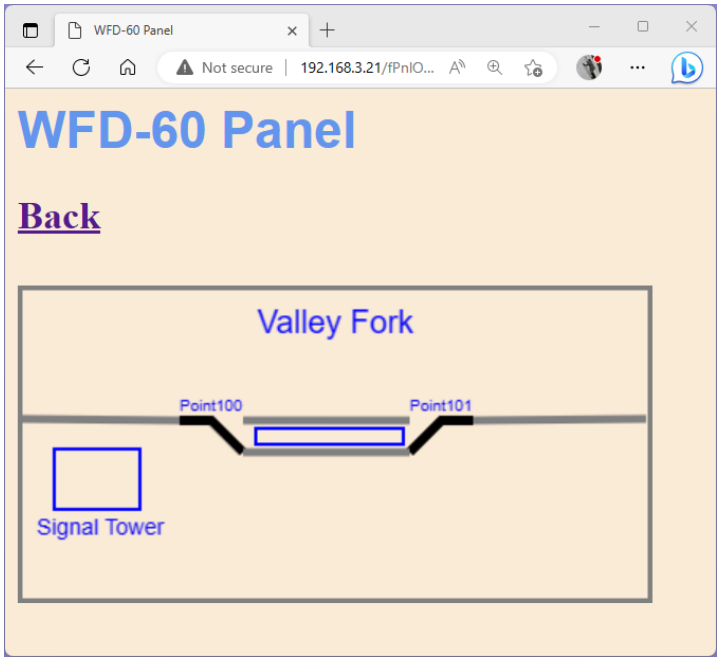


Figure 83 Operating a Panel in Open Mode rather than Edit Mode

Using Buttons on a Panel

Buttons provide an alternative method of operating accessories such as points but are more suited to lights and routes. (Note: Routes are not included on the WFD-60 Version 2.2.X.).

To add a button, click on Button/Switch when in edit mode, then drag the button to a suitable location on the panel. When you select a button, a dropdown appears to allow mapping of the button to a physical controller channel as in Figure 84

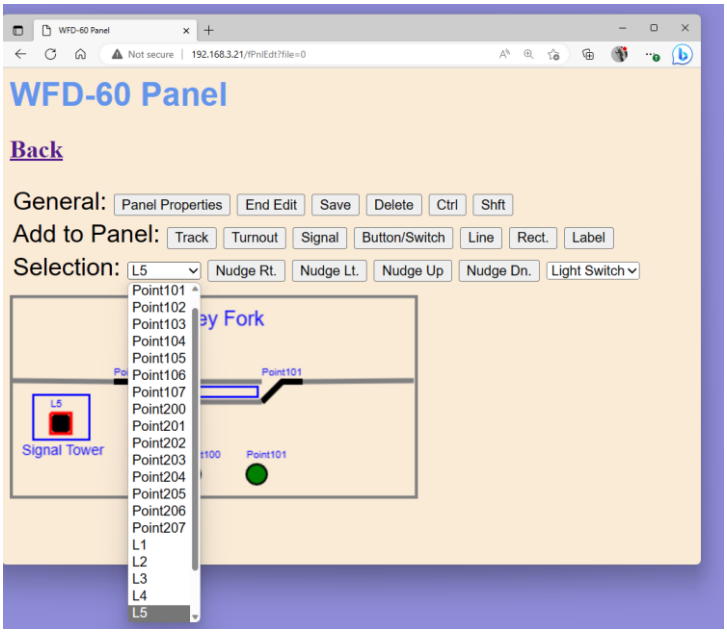


Figure 84 Selecting the Physical Channel for a Button.

Here we have selected a physical channel L5 which is a channel in a WFG-80 Wifitrax Lighting controller. On our layout, this channel is wired to an LED in the Signal Tower. The button will turn the LED on or off. There is also a drop-down to select the type of switch and in this case, in Figure 85, we have selected Light Switch. These buttons can be used for instantaneous actions such as triggering a route or permanently on/off functions such as turning a light on or off and switching a turnout from closed to thrown.

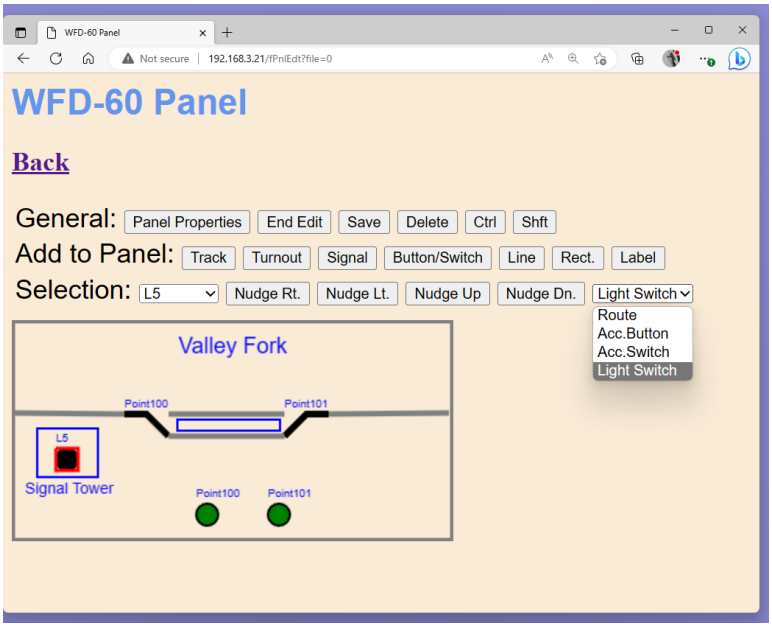


Figure 85 Selecting the Type of Button.

The other two buttons on the panel have been configured as alternative means of controlling the two turnouts as Figure 86.

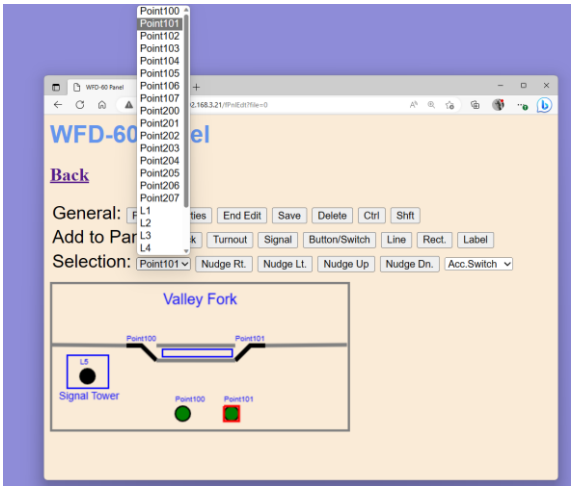


Figure 86 Using buttons to control a turnout.

Reversed Accessory Buttons and Passive Indicators

This section applies only to Version 2.6 and above.

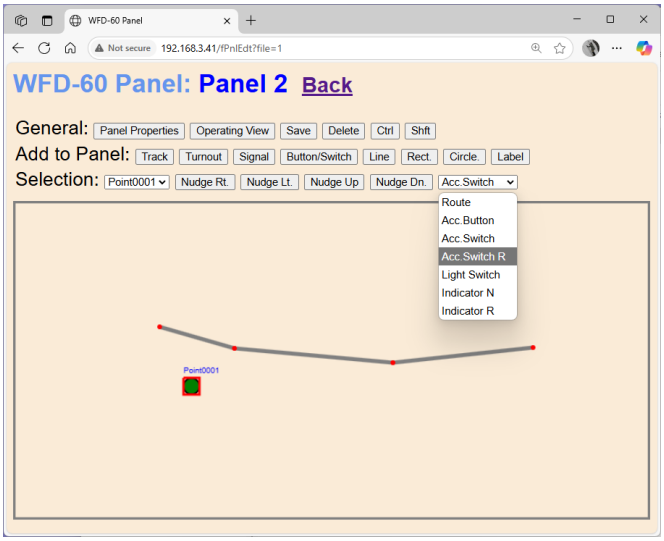


Figure 87 Selecting Accessory switch Reversed and Passive Indicator Normal or Reversed

Buttons chosen as Accessory Switches can be Normal or Reversed. In both cases, clicking or tapping the button will toggle the associated accessory channel, i.e. changing from Close to Thrown or Thrown to Closed. However in the Normal case, the button will show Green when the Accessory is Closed and Red When Thrown. In the Reversed case, the colors will be the opposite.

A button may be chosen as a Passive Indicator, Normal or Reversed, that is, Indicator N and Indicator R. The indicator may be associated with any channel, for example if it associated with a Track Occupation Channel, a Normal Indicator will show Red when the Track is Occupied and Green when unoccupied. A Reversed indicator will show the opposite. Thus Indicators can be used instead of track color to show occupation status.

Using Signals on a Panel

Two kinds of signals are provided in the Panels feature. Two-aspect and three-aspect. The two-aspect signals can be in either Red or Green state. The three-aspect signals can be in red, amber or green.

To place a signal on the panel, click the signal button and move it to the desired location. When a signal is selected, there are two or three dropdowns to select the physical channels as well as a dropdown to select the signal type, as in Figure 88. Here we have selected a two-aspect (two-colour) type of signal and so two physical channels must be selected, one for the red LED and one for the blue LED. These are chosen in Figure 89. Again we are using the channels of a WFG-80 module having connected channel 1 (L1) to a red LED and Channel 2 (L2) to a green LED in a home-made signal.

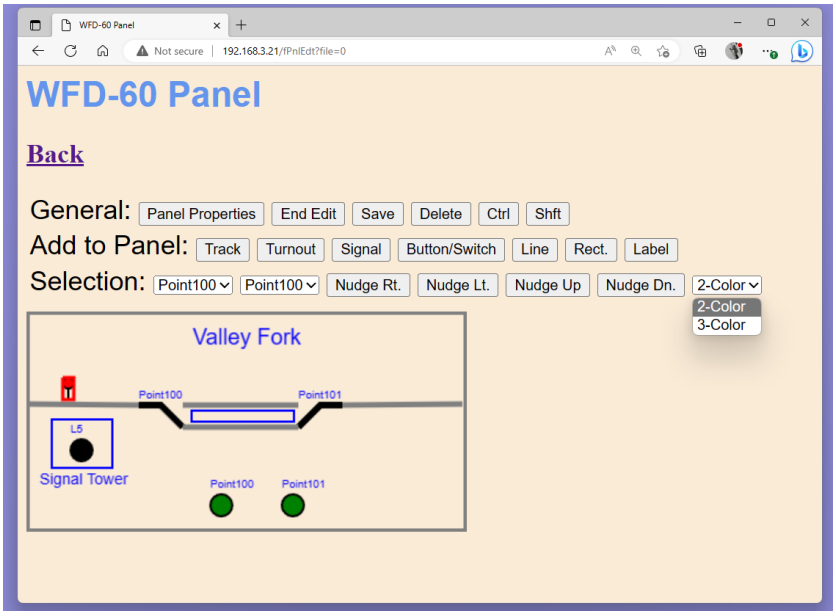


Figure 88 Setting the Properties of a Signal in a Panel.

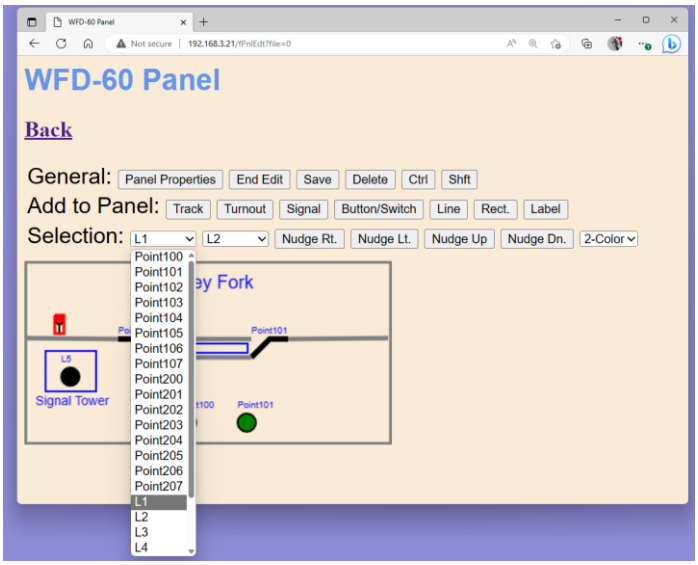


Figure 89 Setting the Physical Channels for a Two Aspect Signal.

Saving and Restoring Panels

Panels can be saved to your computer as files and restored in a similar manner to Locomotives and Accessories.

Once you have set up a set of Panels, it is a good idea to download and store them in a file on your PC or other device. For example, if you need to reset the module for some reason, the panels list will

return to its default and you will have wasted all that work. You also might like to have separate panels if you use the WFD-60 at a club as well on your own layout.

IMPORTANT: On the Engine Driver and WiThrottle apps, you cannot use the Web display within the app to download or upload a panel list. You must open the WFD-60 Web Pages in a browser such as Safari or Chrome by typing its IP Address into the browser. If you are in home net mode you use the IP Address assigned by your router. Select the Panels page and proceed as described.

To download all or part of a panels list, click Download on the WFD-60 Panels List page. The page within the list that you are currently displaying has no effect. The Panels Download page will appear as in Figure 44.

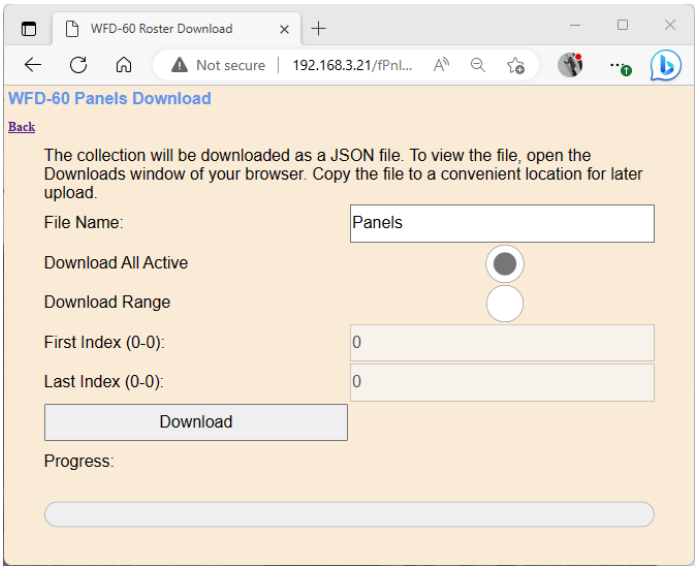


Figure 90 The Panels Download Page

There are 8 indices (panel index numbers) in the list. Usually only some have been filled and are considered active, so only active list entries will be downloaded.

The File Name is the name given to the file that will be downloaded, so give it a meaningful name that you will recognize.

You can elect to include all of the panel entries into the file or just a range. Therefore select “Download all Active” or “Download Range” accordingly.

If you select “Download Range” enter the First and Last Index as required. For example, if you just want to download the first 3 panels, use 0 and 2 as the values. Notice that indices begin at 0. You may want to go back to the Panels List page and jot down the first and last index.

Click the Download button to start the download. A Progress Bar shows the download progress.

When the download is complete, the action depends on the browser and device you are using.

Uploading a Previously Downloaded Panels File

To upload a previously save set of panels go to the Panels List page and click the Upload link. On the Panels Upload page, click the Choose File button and navigate to your saved panels file. Click Open. The chosen file name should show against the Choose File button as in Figure 68. To complete the upload, click the Upload button.

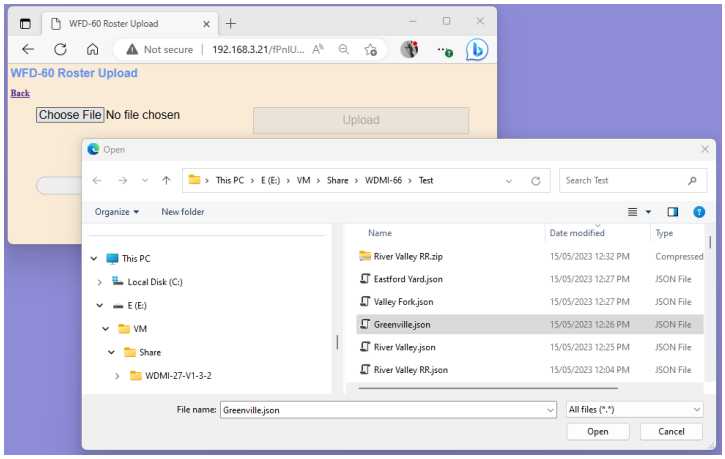


Figure 91 Opening a Previously Saved Panels File

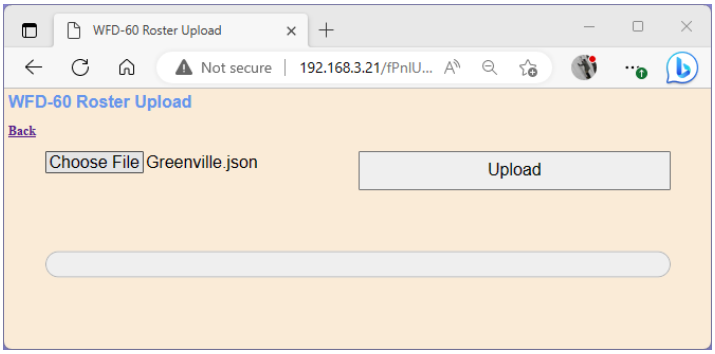


Figure 92 The Chosen File to be Uploaded is Displayed

The progress bar shows upload progress. When complete, the Panels List page is displayed showing the newly uploaded panels.

Note that uploading is controlled by the indices assigned to panels (i.e., location numbers in the panels list), that are stored in the file. If panels already exist at those locations in the list within the WFD-60, they will be overwritten. If they do not exist, they will be created. If you upload several files that have sets of panels with gaps between indices either within a file or between files, panels will appear in the WFD-60 list with those exact same indices. So, there may be gaps in the list. This does not matter but, if you add panels, you will fill the gaps. You can also move the panels up or down and save the whole file again.

Factory Reset

You may factory reset your WFD-60 by selecting the Reset option on the main menu page. You will be asked to confirm the reset, as Figure 93 and then the unit will immediately revert to its factory configuration. All the settings will take their default values and Home Net settings will be removed. The locomotive roster and Accessory List will return to their default values.

You can also reset your WFD-60 by pressing and holding the Reset button on the module for about 10 seconds. When the green LED starts to flash rapidly, release the button. You will need to use your figure nail or a small screwdriver carefully to operate the reset button and you should feel a distinct click when you press it correctly.

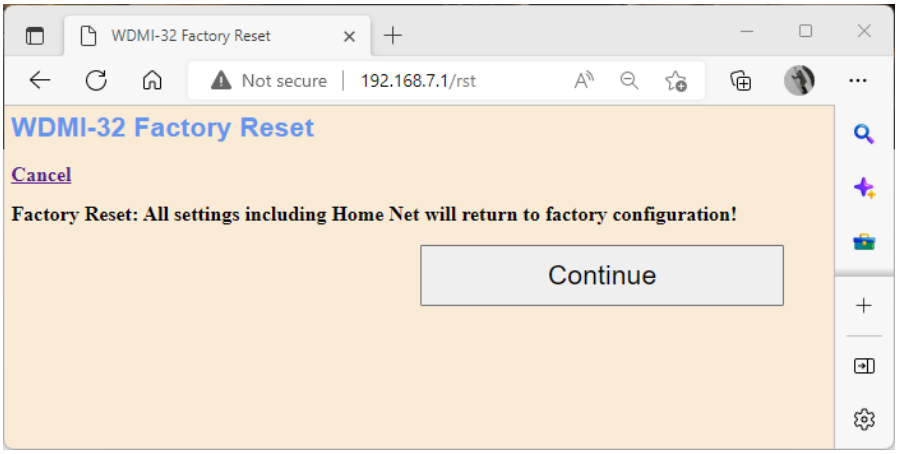


Figure 93 Factory reset confirmation page

Using the WFD-60 DCC Input

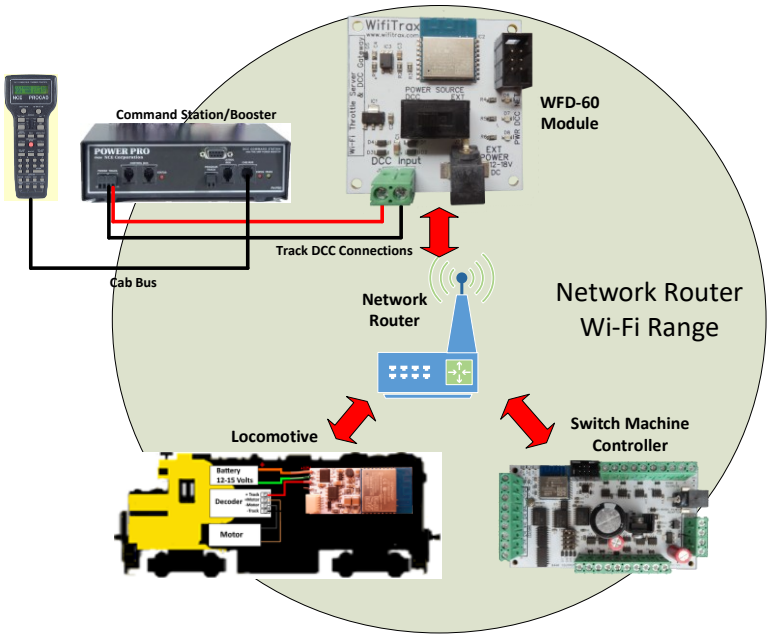


Figure 94 DCC Command Station/Booster Connected to a WFD-60. NCE Power Pro is used only as an Example.

Figure 94 shows a DCC Command Station, with Cab, connected to the DCC Input terminals of the WFD-60. An NCE Power Pro and Pro Cab is used as an example, but and NMRA Compatible Command Station/Booster can be used.

The DCC System can be used both to drive trains and to operate accessories.

To drive a train, simply select a loco on your DCC system with a DCC Address that is present in the Locomotive Roster of the WFD-60 and use your DCC system as normal. DCC Commands will be sent by the command station intended for the loco, but will be received by the WFD-60 module. These will be decoded using its in-built DCC Decoder, converted to messages and sent to the Wifitrax Wi-Fi/DCC interface module in the locomotive. In the locomotive, the DCC Commands are recreated and delivered to the loco's decoder. So DCC is really being sent over Wi-Fi. This operates for speed control and function control, so you can operate your lights, horn, bell etc. just as though the locomotive was on a DCC track.

To operate an accessory, select the accessory on your command station and select Normal or Reversed to set the switch to Closed or Thrown respectively. Some command stations may indicate these as Closed or Thrown. If your command station reverses the sense of these, you can use the DCC Sense Reversed checkbox on the Accessory Edit page to correct this.

Of course, if you have your DCC Command Station connected to JMRI or some other train control software, this will also work to run trains and operate accessories.

The WFD-60 does not, at present allow programming of Configuration Variables (CVs) via the DCC input, so this aspect of JMRI will not operate and you cannot program loco CVs from your DCC Command Station using the WFD-60 DCC Input.

Tips to Manage your Home Network

Connection to your Home Router

When you join a WFD-60 module to your 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.

Why does my module fail to connect to the router?

There could be several reasons if this happens.

(1) Usually, failure to connect occurs because the password or SSID is incorrect, so you would need to double check that. Be sure that the case is correct in both the SSID and the Password. Make sure there are no extra spaces at the end or beginning. Make sure you have not entered a letter “O” when it should have been a zero “0”.
(2) You might have used the 5GHz SSID. You MUST use the 2.4GHz SSID. Wifitrax modules will NOT connect to a 5GHz Wi-Fi access point.
(3) The router could be too far away or is turned off.
(4) Routers need to allocate a unique IP Address to each module connecting. Your router may refuse a connection because it has insufficient IP Addresses available. This could be that it has not been setup properly or it could be that many guests have connected and all the available IP Addresses have been used up. Cycling power on the router will often correct this.
(5) Sometimes routers refuse connections because of some unknown internal hang-up problem – perhaps a firmware bug – and need to be restarted from time to time.
(6) 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 WFD-60 always uses the Wi-Fi channel of the router that it is connected to.

Home Net IP Address Assignment

Every device connected to a network needs an IP Address and when your WFD-60 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 WFD-60, the lease will have expired and the router will give it a different IP Address.

This changing IP Address does not matter if you are using 3rd-party apps using the Hoffman WiThrottle Protocol (like Engine Driver and WiThrottle) because they discover one or more WFD-60 modules using a protocol called Multicast DNS. The WFD-60 broadcasts its presence, with its information, to all devices connected to the network, and the Engine Driver and WiThrottle apps display WiThrottle servers found in this way in their list of discovered servers. You then connect to your choice of WiThrottle server when you start the app.

Sometime the Discovery process using Multicast DNS does not work reliably, in which case you can connect to the WiThrottle Server you connected to last time, from the Recent list. Or if you know the IP Address of your module, you can type it in manually.

Also, if you want to access your WFD-60 from a browser such as Internet Explorer, Edge, Chrome or Safari, you need to know its IP Address.

Finding the IP Address Assigned to your WFD-60 Module

There are several good ways of finding the IP Address assigned by your router.

(1) Once you have connected using an app such as WiThrottle or Engine Driver, you can use the "Web Page" menu item or tab to view the Settings page as in section "General Settings Web Page". Once you see the IP Address, you can make a note of it and type it into a browser as in section "Setup Advanced Features using a Web Browser".
(2) You can use the FindModules app described in the section "FindModules App".
(3) Probably the best way is to get it from the Admin page of your router.
    a. To do this, you need to first type the address of your gateway into a browser. You can find this by opening a Windows command console and typing the ipconfig command:

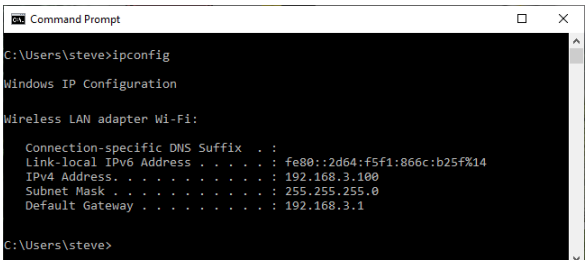


Figure 95 Using ipconfig to find your computer's IP Address and Default Gateway

    b. Figure 95 shows the result. The computers IP Address is 192.168.3.100 and 192.168.3.1 is its default gateway. 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.

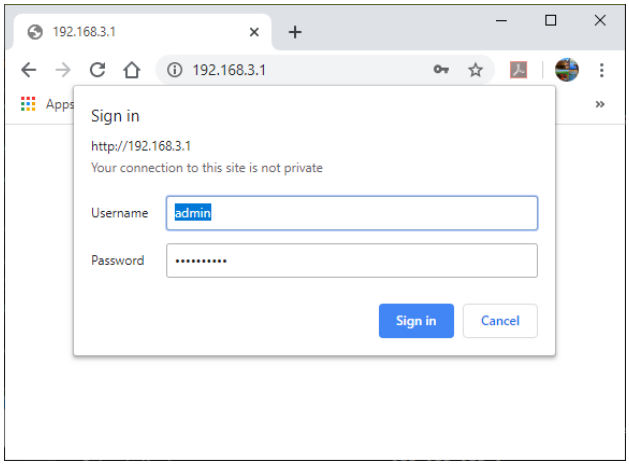


Figure 96 Access your router by using the IP Address of your default gateway in a browser

    c. The browser will ask for your Username and Password to access your router's admin page. You can find this in one of these places, unless you have changed it:

i. 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),
ii. On a card supplied by your internet service provider or telco,
iii. In the leaflet that came with your router.

d. Once you have given the credentials, you will see the Admin page. A typical one is shown in Figure 97. Find the “Attached Devices” option and click on it.

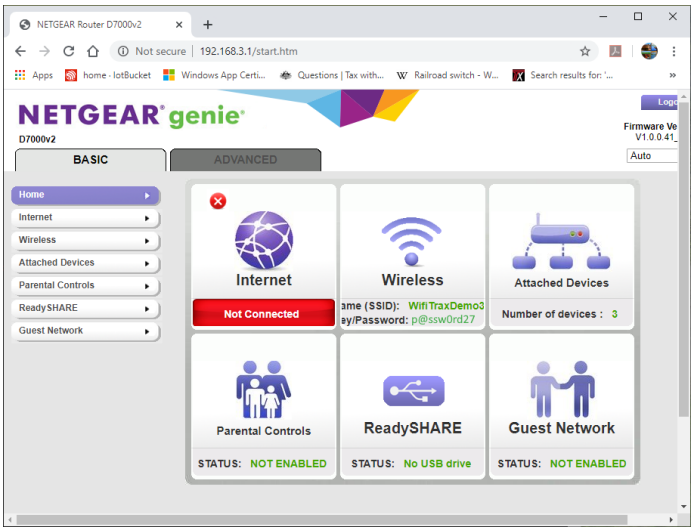
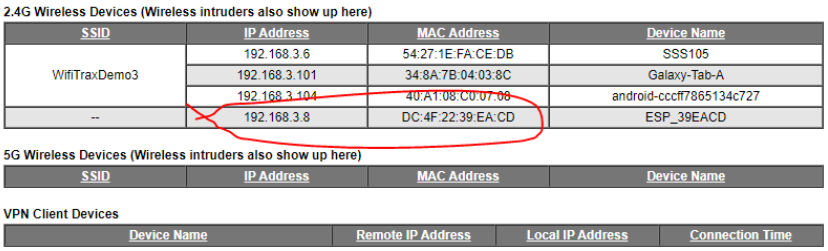


Figure 97 A typical router admin page



2.4G Wireless Devices (Wireless intruders also show up here)

SSID	IP Address	MAC Address	Device Name
WifiTraxDemo3	192.168.3.6	54:27:1E:FA:CE:DB	SSS105
	192.168.3.101	34:8A:7B:04:03:8C	Galaxy-Tab-A
	192.168.3.104	40:A1:08:C0:07:08	android-cccff7865134c727
--	192.168.3.8	DC:4F:22:39:EA:CD	ESP_39EACD

5G Wireless Devices (Wireless intruders also show up here)

SSID	IP Address	MAC Address	Device Name

VPN Client Devices

Device Name	Remote IP Address	Local IP Address	Connection Time

Figure 98 Typical "Attached Devices" page of a router

e. You will see a screen something like Figure 98. Find the row where the MAC address matches that printed on the bag label of your WFD-60 device. Here the MAC Address `DC:4F:22:39:EA:CD` matches the STA MAC Address on the bag label, so `192.168.3.8` is the IP Address. Another clue is that the Device Name of Wifitrax Modules begins with the letters “ESP_”.

f. Now open another tab in your browser and type the IP Address, `192.168.3.8` in this example, into the address bar to get the main menu web page of your module as Figure 99.

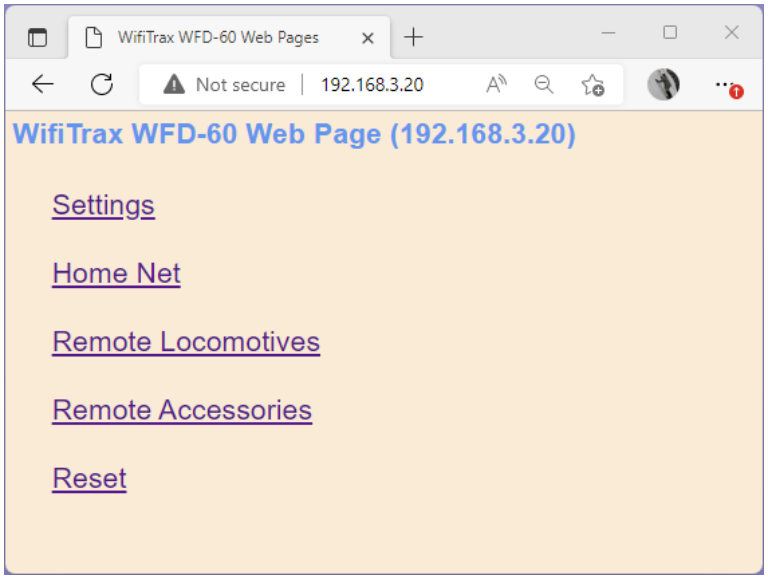


Figure 99 Use the IP Address to open the main menu web page

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.

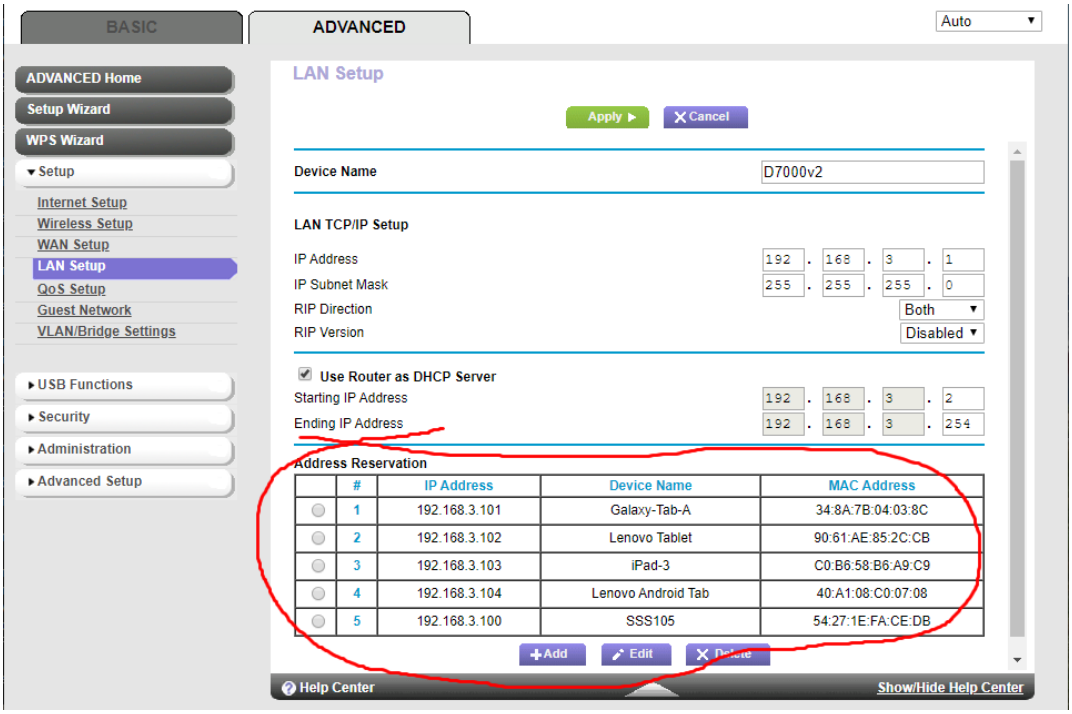


Figure 100 An IP Address reservation table in a router

So, while you're in the router admin page you can *reserve a fixed IP Address* for your WFD-60 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 (LAN stands for Local Area Network). The table at the bottom of Figure 100 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 information from Figure 98. In this example it's

```
IP Address:  192.168.3.8
MAC Address: DC:4F:22:39:EA:CD
Device Name: WFD-60
```

Then hit Add as Figure 101.

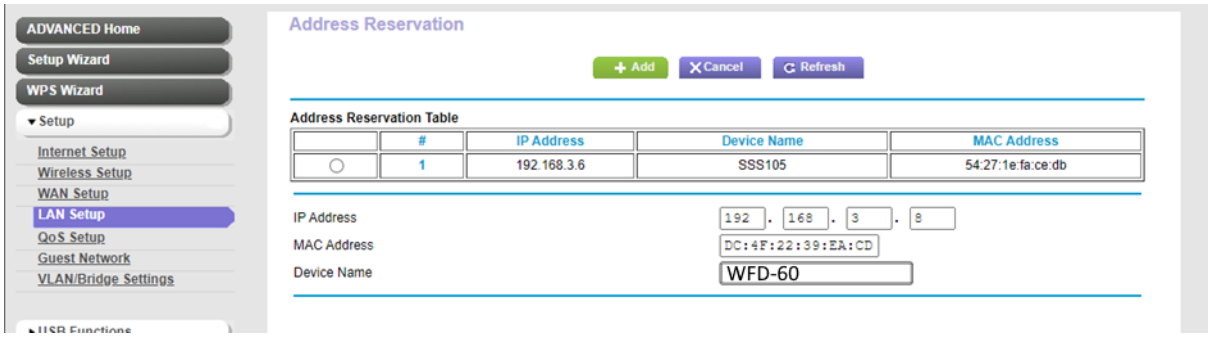


Figure 101 Adding an address reservation

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.

More Information

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 Wi-Fi/DCC Interface 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 WFD-60 Wi-Fi/DCC Interface Module as pictured in Figure 102 and identified by a label on underside of module bearing the model number WFD-60.

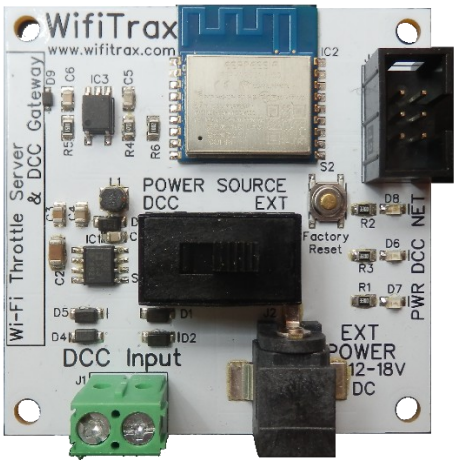


Figure 102 Identifying Illustration for WifiTrax Model WFD-60 EU Declaration of Conformity

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 November 7, 2022, Berowra NSW Australia