

WNI-32 Wi-Fi Insert Module for NCE Cabs

Operating Manual

This document is online at <http://www.wifitrax.com/manuals/WNI-32/WNI-32-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.

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Version History

Version	Changes
1.0	Initial Release
1.1	Added Network information, complex configurations
1.2	Added Expansion Screen Information, Power Off, Power Timer and Factory Reset information.
1.3	Minor corrections

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Scope of this Document

This document describes detailed use of the following Wifitrax products:

WNI-32 Wi-Fi Insert Module for NCE Cabs. For a simple starting guide, please see the leaflet at <http://www.wifitrax.com/appNotes/quickStart/WNI-32-Quick-Start.pdf>

This manual applies to firmware versions listed below, (i.e., version numbers 1.X.X). Some features described may not be present in earlier versions.

Product	Description	Firmware Version
WNI-32	Wi-Fi Insert Module for NCE Cabs	1.0.0 and Later

Please note that sections in this manual may apply only to a subset, one or more, or all of these products. This is identified in each section.

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What does the WNI-32 Wi-Fi Insert Module for NCE Cabs do?

The WNI-32 Insert Module converts your NCE Cab into a Wi-Fi Cab that will work with any DCC Command Station that uses the WiThrottle Interface. The WiThrottle interface is a defined set of commands and responses that enable a cab to communicate with a DCC command station via Wi-Fi. It therefore gives you the ability to walk around your layout controlling locomotives and accessories without tethering your hand-held device. Many modellers use a smart-phone with an app installed such as WiThrottle by Beth Hoffman or Engine Driver by Steve Todd to control their trains via either JMRI or a Wifitrax module such as the WFD-30. The popular UWT-100 and UWT-50 by TCS provides the same capability.

Now Wifitrax has developed the WNI-32 that can be installed in your existing NCE Pro-Cab, Power Cab or Cab06 to make you NCE Cab into a Wi-Fi Throttle that works with modules such as WFD-30 as well as JMRI. With the WNI-32 installed:

- You can drive trains and control accessories using an untethered ProCab via Wifitrax WFD-30 or WFD-31 connected to your NCE Command Station,
- You can drive trains and control accessories using an untethered ProCab via Wifitrax WFD-26 WFD-27 and WFD-28 DCC Command Stations (together with boosters in the case of WFD-26 and WFD-28),
- You can drive trains and control accessories using an untethered ProCab via an installation of JMRI on your existing computer that is connected to your home network.
- The above capabilities described for NCE ProCab also apply to NCE Cab06 and NCE PowerCab working in Pro-Cab mode, where you have a different DCC Command Station. (If

Four NCE Cabs with WNI-32 can connect to a Wifitrax module (Such as WFD-30, WFD-32 etc.) at the same time but you can increase this limit to six with the WNI-32 and other Wifitrax Module in Home Net mode as described later in this manual. You can also use more than one WFD-30 or WFD-31 on the same NCE Command Station or the WFD-26 Command Station. These more complex configurations are described later in this manual.

WNI-32 works with JMRI but you don't need to install JMRI to use it with WFD-30, WFD-31, WFD-26, WFD-27 and WFD-28

What is WiThrottle protocol?

WiThrottle protocol is a set of commands and data formats, authored by Beth 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 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 at <https://www.jmri.org/>

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WNI-32 Connections and Indicators

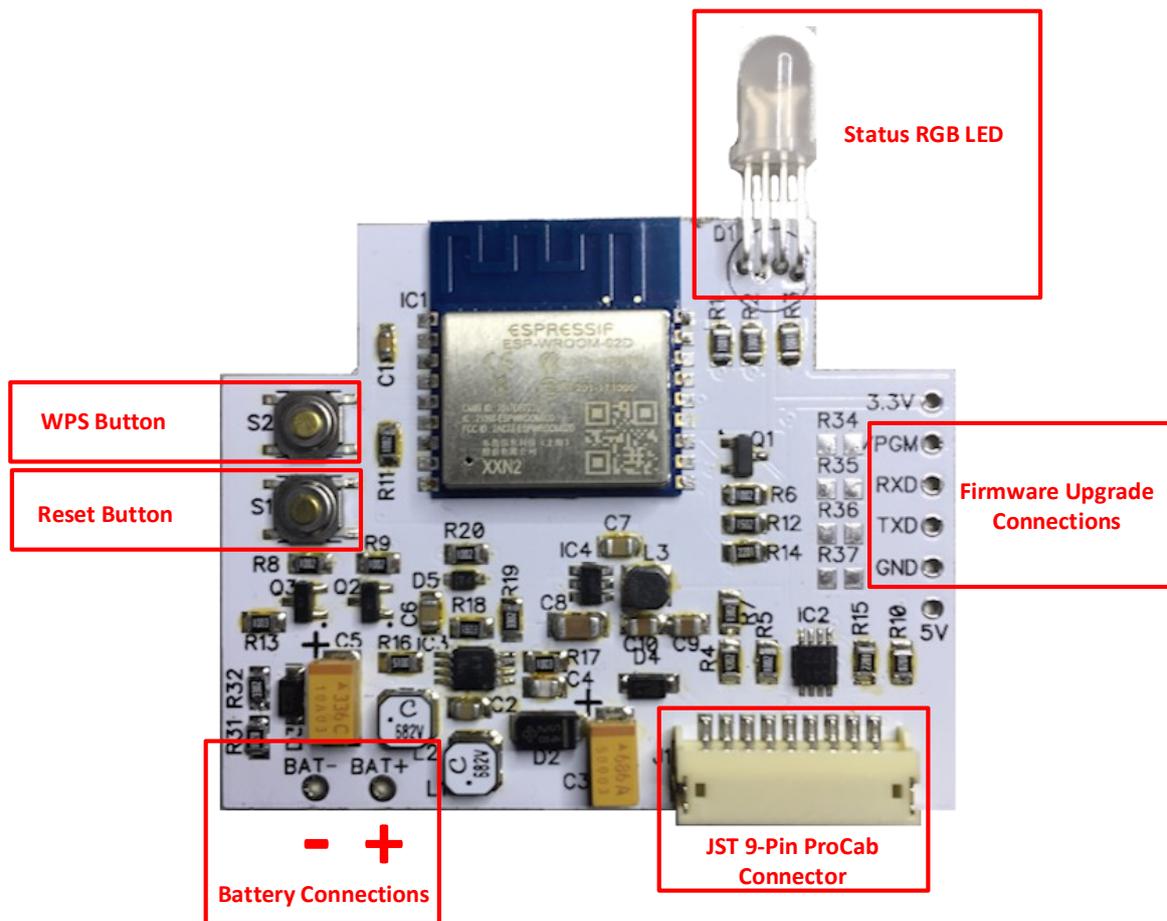


Figure 1 Connections on the WNI-32.

Figure 1 shows the WNI-32 module with its connectors, buttons and indicators labeled. The battery leads are soldered into the BAT+ and BAT- at the lower left. Four AAA batteries can be used. These can be rechargeable or non-rechargeable. The battery pack should be connected with the correct polarity.

On the lower right of the diagram, is the 9-pin JST Connector that connects to a similar connector on the main printed circuit board of your NCE ProCab or Power Cab. This connector uses the same pin connections as the NCE Radio module and therefore connects in the same way.

The Firmware Upgrade Connections are used in conjunction with a Wifitrax FWA-10 Firmware Upgrade Module to install the firmware in the factory. They can also be used to upgrade the firmware using the Wifitrax Workshop software.

At the top right is the Status LED. This indicates the status of the module's connection, both to the ProCab and to the chosen DCC Command Station via its WiThrottle Protocol Server.

At the top left is the WPS Button. This can be used to initiate a connection to a protected home network, in conjunction with the WPS button on your router. This function is also available from your ProCab with the WNI-32 installed. This is described later in this manual.

Below the WPS button is the Factory Reset button. Pressing and holding this button for approximately 10 seconds will cause a complete factory reset of the module. When the button has

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been held down for about 10 seconds the status LED will flash several times and the module will reset.

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WNI-32 in Context – an Example Installation

There are various ways in which the WNI-32 can be installed and operate with an NCE Cab and a DCC Command Station. Various alternatives are described later in this manual but here is described the simplest way in which the WNI-32 can be used as a first example.

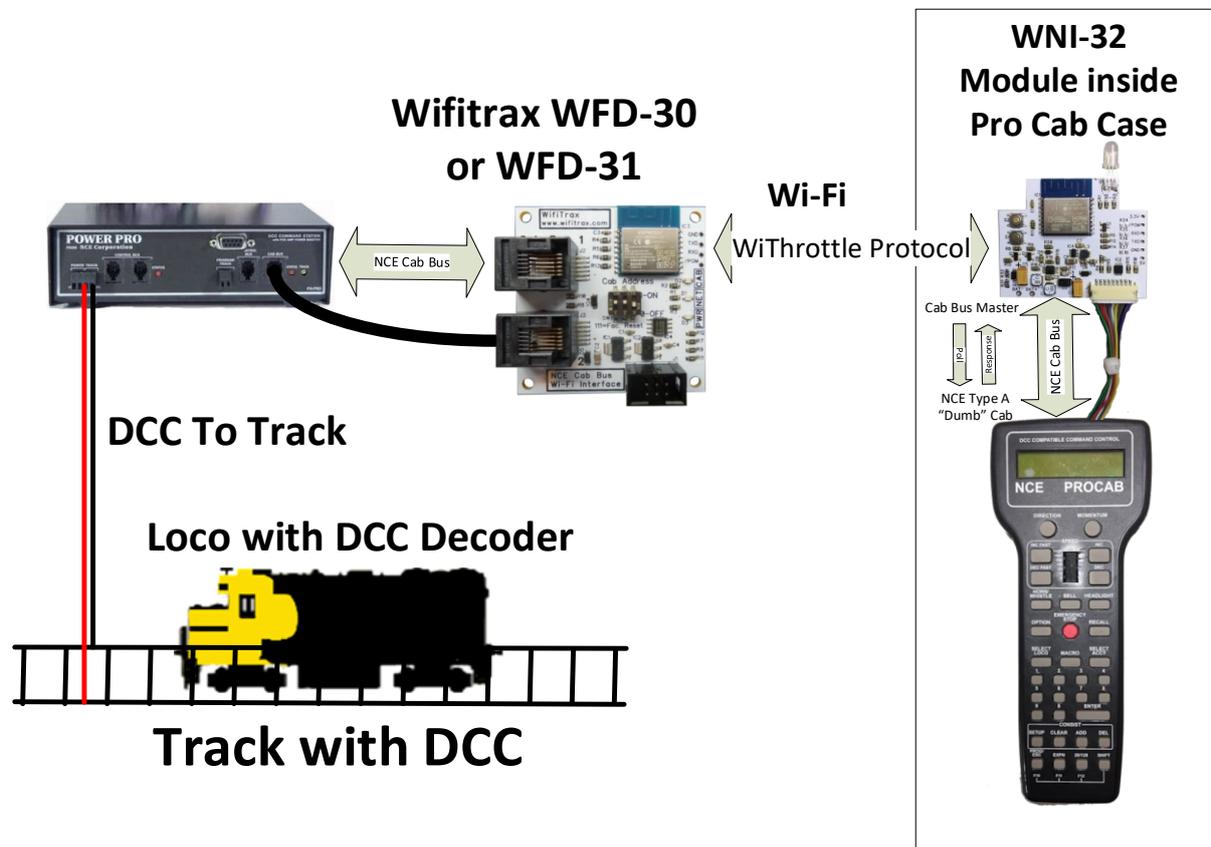


Figure 2 Using a WNI-32 with an NCE ProCab, a Wifitrax WFD-30 and an NCE Power Pro Command Station

Figure 2 shows a simple way in which the WNI-32 can be used. On the left is an existing NCE DCC System, a Power Pro, with the addition of a Wifitrax WFD-30. On the right is an NCE ProCab with the addition of a WNI-32. The WNI-32 is mounted inside the Pro Cab plastic casing in the same way as the NCE Radio Module, connected to the main board of the Pro Cab using a 9-conductor cable with a JST 9-pin connector at each end (the diagram shows the WNI-32 as being outside, just to clarify the connections and communications). The WNI-32 acts as an NCE Cab Bus Master, just as though it is a DCC Command Station supporting the NCE Cab Bus Protocol as a Cab Bus Master. The WNI-32 polls the Pro Cab and the Pro Cab responds and communicates its key presses as though it is talking to an NCE Command Station. The WNI-32 responds to key presses and updates the screen of the Pro Cab just as though it were an NCE Command Station.

WNI-32 Status LED

The inclusion of this item is optional. Its use requires the drilling of a 5mm hole in the Pro Cab plastic casing as specified in the installation instructions. The WNI-32 may be ordered without the LED or, if not required it may be carefully cut off the WNI-32 module and discarded, being careful not to (a) damage the module circuit board and (b) not leave parts of the leads so that they touch.

The status LED is an RGB LED which means it has a Red, Green and Blue LED combined into one.

The Red LED is on as long as the module is powered.

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The Green LED is on when the module is connected to a DCC Command Station via its WiThrottle Server. The Green LED flashes at various rates when a connection is being established to a WiThrottle Server.

The Blue LED is on when the WNI-32 module is connected successfully to you NCE ProCab. It flashes to indicate a low battery condition.

Red LED: The LED is illuminated when power is supplied to the module.

Table 1 indicates the behavior of the Status LED when the WNI-32 is operating as in Figure 2.

Status		Red LED	Green LED	Blue LED	Visible Color
First Power On	Waiting	On	Off	Off	Red
WNI-32 Communicating with Pro Cab	Pro Cab Display now Operates	On	Off	On	Pink
WNI-32 Establishing Connection with WFD-30	Connecting Wi-Fi	On	Flashing	On	Flash between White and Pink
WNI-32 Connected to both Pro Cab and WFD-30	Ready to Operate Trains	On	On	On	White
Battery Low	Charge Batteries or replace	On	On	Flashing	Flash between White and Green

Table 1 The Status LED Under Operating Conditions

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Let's get Started!

Installing your new WNI-32 In an NCE Pro Cab

Important Note: This section describes work that requires opening your NCE Pro Cab, removing the NCE circuit board, drilling a hole in the plastic case, installing the WNI-32 module in place and connecting it to the NCE circuit board and re-assembling the plastic case. Unless you are thoroughly competent with electronic assembly, you should return the Pro Cab to an NCE dealer for installation of the WNI-32. You may invalidate your NCE warranty by doing the installation yourself. You may also break either the WNI-32 or the NCE Pro Cab. Wifitrax will not be responsible for damage caused by careless or incorrect installation.

- (1) Remove the back of your NCE Pro Cab by removing the eight screws visible in Figure 3. Also remove the smaller screw that holds the battery compartment cover panel and remove it.



Figure 3 Removing the Back Panel of the Pro Cab or Power Cab

- (2) Examine the inside of the Pro Cab as in Figure 4. Take note of the NCE Radio Module Connector indicated in Figure 4.

Some Pro Cabs may not have this connector installed with only the circuit board pads visible at its location. If this is the case, the connector must be installed and you are strongly advised to ask your NCE Dealer to do this for you. Considerable soldering skill is needed to install this connector and it is extremely important that there are no solder bridges between the nine leads that must be soldered to the pads on the circuit board. The pads are spaced at only 1.5mm and so a small iron must be used and the connector checked for shorts once soldering is complete. **Solder bridges between the connector leads may cause damage to both the WNI-32 and your Pro Cab for which Wifitrax will not be responsible.**

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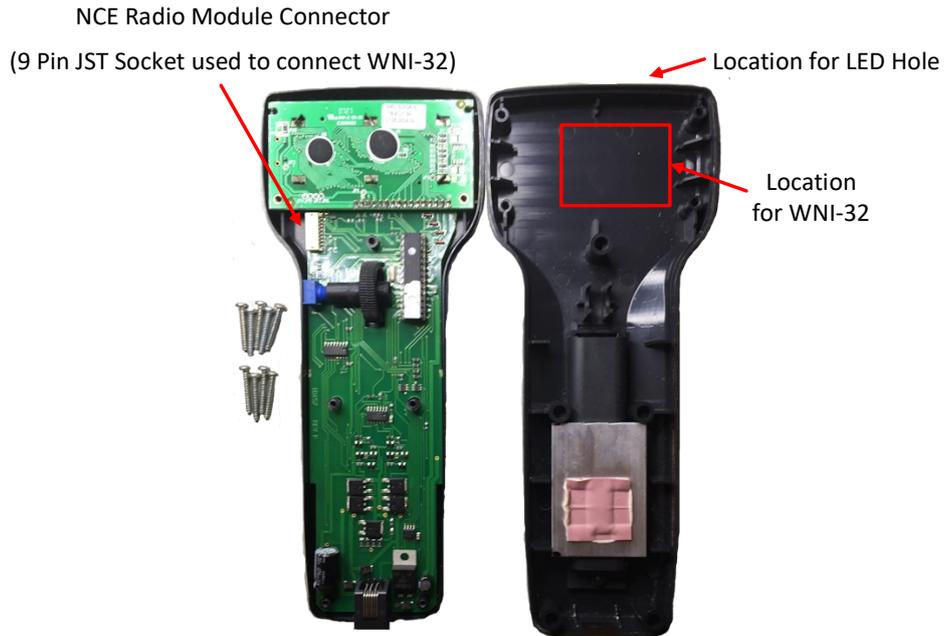


Figure 4 The Power Cab Internal

- (3) Assuming the connector has been installed, the next step is to install the battery connectors in the NCE Pro Cab rear cover.

First thread the red wire through the right-hand, lower, connector hole as in Figure 5 and the black wire through the left-hand connector hole. Check Figure 6 that shows the other side.

Press the spring contacts firmly onto the plastic as in Figure 5.

Press the double spring contact onto the upper location in Figure 5.

Carefully route the wires on the other side to the left of the battery, as Figure 7, compartment ready for attachment to the terminals on the WNI-32 module. Tape them down with some sticky tape.

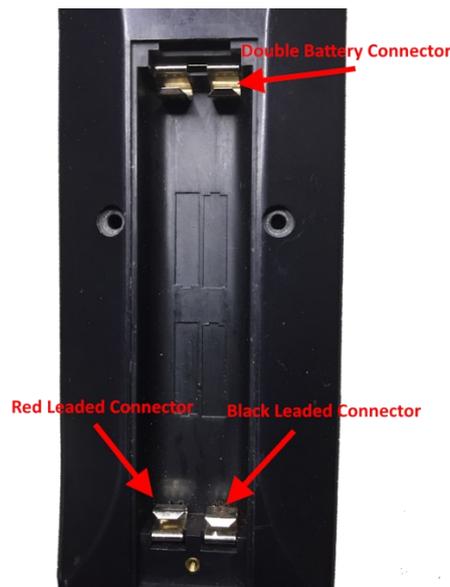


Figure 5 Installation of the spring battery contacts.

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Figure 6 Check inside to make sure the leads to the battery are installed correctly



Figure 7 Route the leads carefully to the left of the battery compartment and tape them down.

- (4) Stick a square of double-sided tape as shown in Figure 7, ready to hold the WNI-32 module.
- (5) Plug one end of the 9-way cable into the 9-pin socket on the WNI-32 module as Figure 8.



Figure 8 Connect the 9-way cable to the WNI-32 module

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- (6) Remove the main circuit board from the case and plug the other end of the 9-way cable into the 9-way socket on the circuit board as Figure 9.

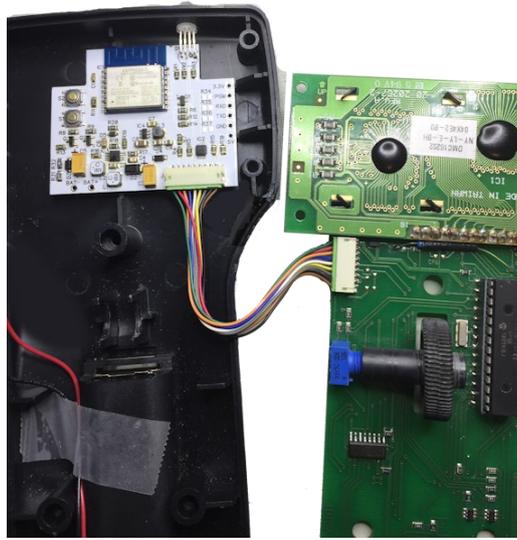


Figure 9 Connect the other end of the 9-way cable to the 9-way socket on the main circuit board

- (7) Solder the battery leads to the holes in the WNI-32. Some modules may have screw terminals to avoid the need for soldering.

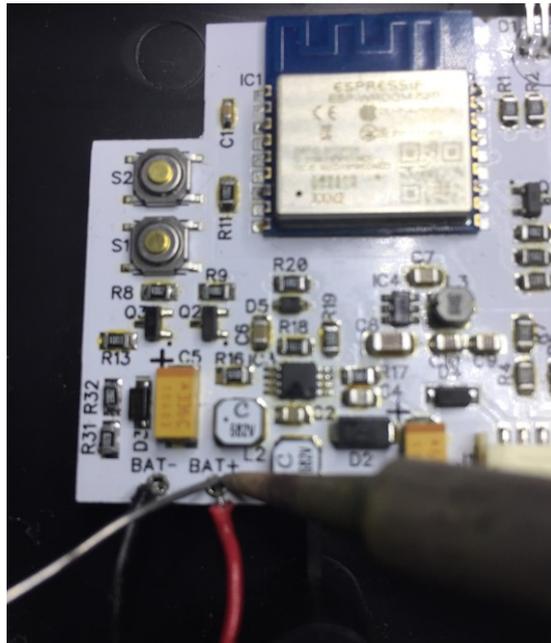


Figure 10 Solder the battery leads to the WNI-32 module. Some modules may have screw terminals to avoid soldering.

- (8) Replace the main circuit board in the plastic case, as Figure 11, making sure that neither the 9-way cable nor the power leads get trapped.

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Figure 11 The main circuit board replaced

- (9) Replace the back on the Pro Cab. Tighten all of the screws but do not over-tighten.
- (10) Place four AAA batteries in the battery compartment being careful to get them in the correct alignment. See Figure 12.

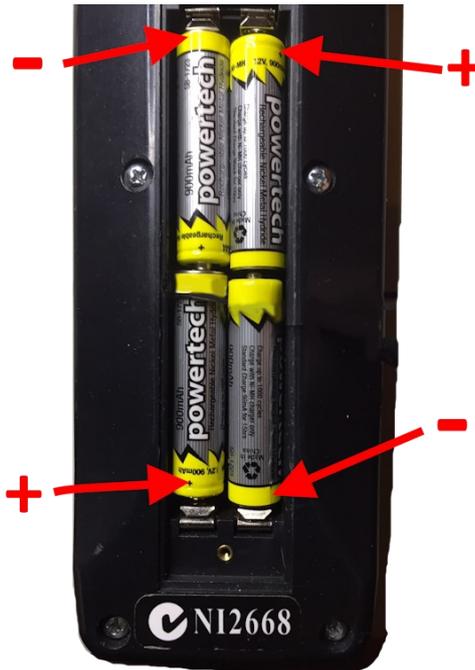


Figure 12 Alignment of the batteries.

- (11) Replace the battery compartment cover.

Now you have a Wi-Fi Pro Cab!

YOU ARE READY TO START RUNNING TRAINS – Go to the next section.

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Driving your First Trains

Once you have installed your WNI-32 module in a Pro Cab making it a Wi-Fi Pro Cab, and installed four AAA batteries (rechargeable or non-rechargeable), you can go through the setup procedure as described below.

Actually, setup of the simplest case where your Pro Cab works with a WFD-30 or WFD-31 as in Figure 2, is completely automatic. All you have to do is turn on your Wi-Fi Pro Cab using the red button. Nevertheless the sequence that happens automatically is described below.

- (1) Remove any Cab Bus cable from your Pro Cab. If a cable is plugged in, 12 Volt Cab Bus Power on the cable will disable the WNI-32 from operating.
- (2) Press the Red Emergency Stop button on your Pro Cab firmly. If you have installed with the LED option, the LED will immediately light Red to indicate power is present on the WNI-32 module. The normal Startup screen will appear on the Pro Cab, typically as Figure 13. Notes that the Cab Address here is 03. The WNI-32 will work with any Cab Address from 02 to 63.

N	C	E		P	R	O	C	A	B			V	1	.	3
C	A	B		A	D	D	R	E	S	S		=		0	3

Figure 13 The Pro Cab Startup Screen

- (3) If your module has been installed successfully, after a short while, this screen will be replaced by the WNI-32 Startup screen in Figure 14. This screen shows the WNI-32 firmware version and indicates "CAB OK" meaning that communication between the WNI-32 and the Pro Cab is working OK. At the same time, the LED, if installed, will change to Magenta (pink).

W	I	F	I	T	R	A	X		W	N	I	-	3	2	
V	1	.	0	.	0					C	A	B		O	K

Figure 14 The WNI-32 Startup Screen

- (4) After another short period of time, the screen will change to show the Wi-Fi/WiThrottle Connection Status. To operate properly, the WNI-32 must do two things: First it must connect to a Wi-Fi Network, then it must connect to a WiThrottle Server on that network. Let's assume that you are setting up the basic arrangement shown in Figure 2. Your newly installed WNI-32 must try to find a Wifitrax Product such as a WFD-30 or WFD-31 that acts as a WiThrottle Protocol Server (If you are connecting to JNRI or a Wifitrax module on a home network, please see the section "Getting Started on a Home Network"). To do this, the WNI-32 will scan the Wi-Fi environment looking for one of these products. It can only find one if it is turned on, so you will see the screen in Figure 15 alternating with Figure 16

S	C	A	N	N	I	N	G		F	O	R				
W	I	F	I	T	R	A	X		D	E	V	I	C	E	S

Figure 15 The WNI-32 Connecting Screen

T	U	R	N		O	N		A							
---	---	---	---	--	---	---	--	---	--	--	--	--	--	--	--

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W	I	T	H	R	O	T	T	L	E		S	V	R	.		
---	---	---	---	---	---	---	---	---	---	--	---	---	---	---	--	--

Figure 16 The WNI-32 Server Prompt Screen

- (5) Now turn on your WFD-30 or WFD-31 connected to your NCE Command Station or Power Cab. The Pro Cab equipped with the WNI-32 module will quickly find the WFD-30 or 31 and establish a WiThrottle Protocol connection. The LED, if installed will change to white to indicate connection and the Pro Cab screen will change to the operating screen as in Figure 17. This is the same screen as a tethered Pro Cab would show.

L	O	C	:			*	0		0	2	:	4	9	P	M
F	W	D	:		0	0	0		-	-	-	-	-	-	-

Figure 17 The WNI-32 Pro Cab Operating Screen

You can now select and drive locomotives in almost the same way as with a normal tethered Pro Cab.

Powering Down your Wi-Fi Pro Cab

To Power Down press the EXPN button which shows the first expansion screen, the Power Screen as Figure 18. Press 1 to turn off.

P	O	W	E	R			B	A	T	:	5	.	0	1	V
1	=	O	F	F		2	=	F		E	T	R	=	N	X

Figure 18 The WNI-32 Expansion Screen - Power

Factory Reset

To factory reset the unit, press EXPN to enter the expansion screens then Enter to move to the Reset Screen as Figure 19. Press 1 to Factory Reset the module. Press PROG/ESC to exit without resetting.

R	E	S	E	T		S	N	6	0	2	0	0	1	0	4
1	=	R	S	T		E	N	T	E	R	=	N	E	X	T

Figure 19 Expansion Screen – Reset

Automatic Power Down

If the WNI-32 remains idle for a specified time, it will automatically power-down to save the battery. To specify this time press EXPN then ENTER twice to show the Power Timer screen as Figure 20. Press a number from 1 to 9 to set the power timer to power down after that number of minutes. Press 0 to turn off the Power Timer, so that the device stays on until manually powered down.

P	W	R		T	M	R		V	1	.	0	.	1	2	
0	-	9		M		E	N	T	E	R	=	S	K	I	P

Figure 20 The WNI-32 Expansion Screen – Power Timer

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More Complex Usage

The previous chapter covered the simplest case where the Wi-Fi Pro Cab works with a WFD-30 or WFD-31 connected to an NCE Command Station/Booster such as an NCE Power Cab, NCE Power Pro or SB5A.

This chapter indicates some of the many other configurations where the Pro Cab fitted with the WNI-32 can be used.

Wi-Fi Pro Cab with WFD-31 or WFD-30 and Power Cab

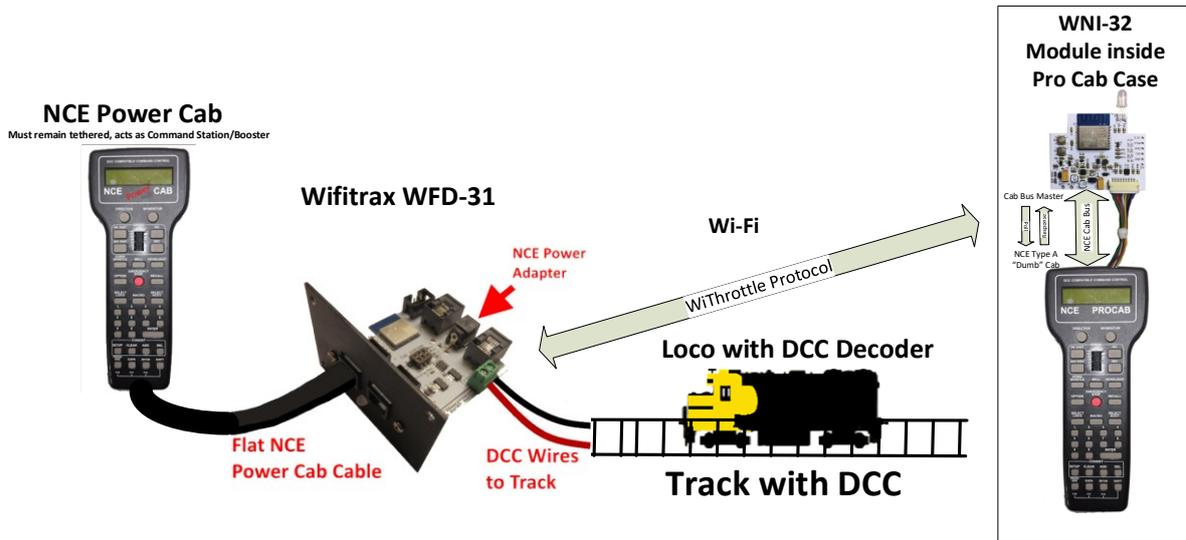


Figure 21 WNI-32 Installed in a Pro Cab working with a WFD-31 and Power Cab

Figure 21 shows a Wi-Fi Pro Cab (an NCE Pro Cab with installed WNI-32) working with a Wifitrax WFD-31 in PCP mode connected to a Power Cab. Here the Power Cab, acting as the DCC Command Station and Booster, supplies DCC to the track. The WFD-31 works on the Power Cab's Cab Bus and acts as WiThrottle Server for the Wi-Fi Pro Cab. Here the Power Cab must remain tethered via the NCE flat cable, and acts as one of the cabs. The Wi-Fi Pro Cab acts as a second, untethered, walk around, cab. Up to four Wi-Fi Pro Cabs may be connected to the WFD-31.

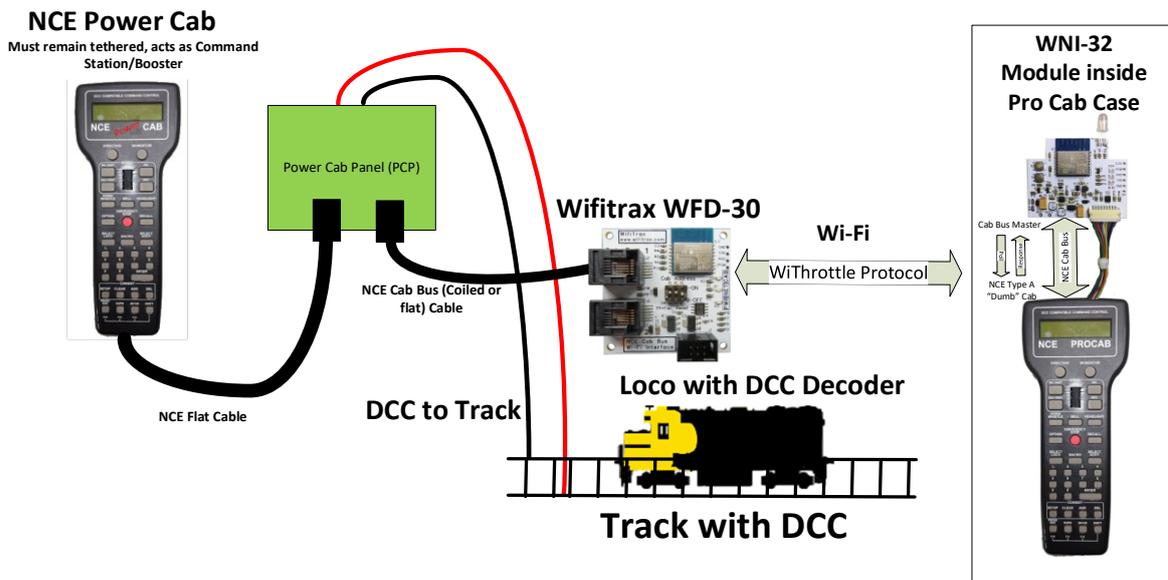


Figure 22 WNI-32 Installed in a Pro Cab working with a WFD-30, Power Cab Panel and Power Cab

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Figure 22 is a variation using the original NCE Power Cab Panel that came with the Power Cab. Here a WFD-30 is used to connect to the Cab Bus of the Power Cab via the second socket on the Power Cab Panel. Again the Power Cab must remain tethered as it provides the DCC to the track. The Wi-Fi Pro Cab is an untethered walk-around throttle.

Multiple WFD-30 Modules Wi-Fi Pro Cab and NCE Power Pro

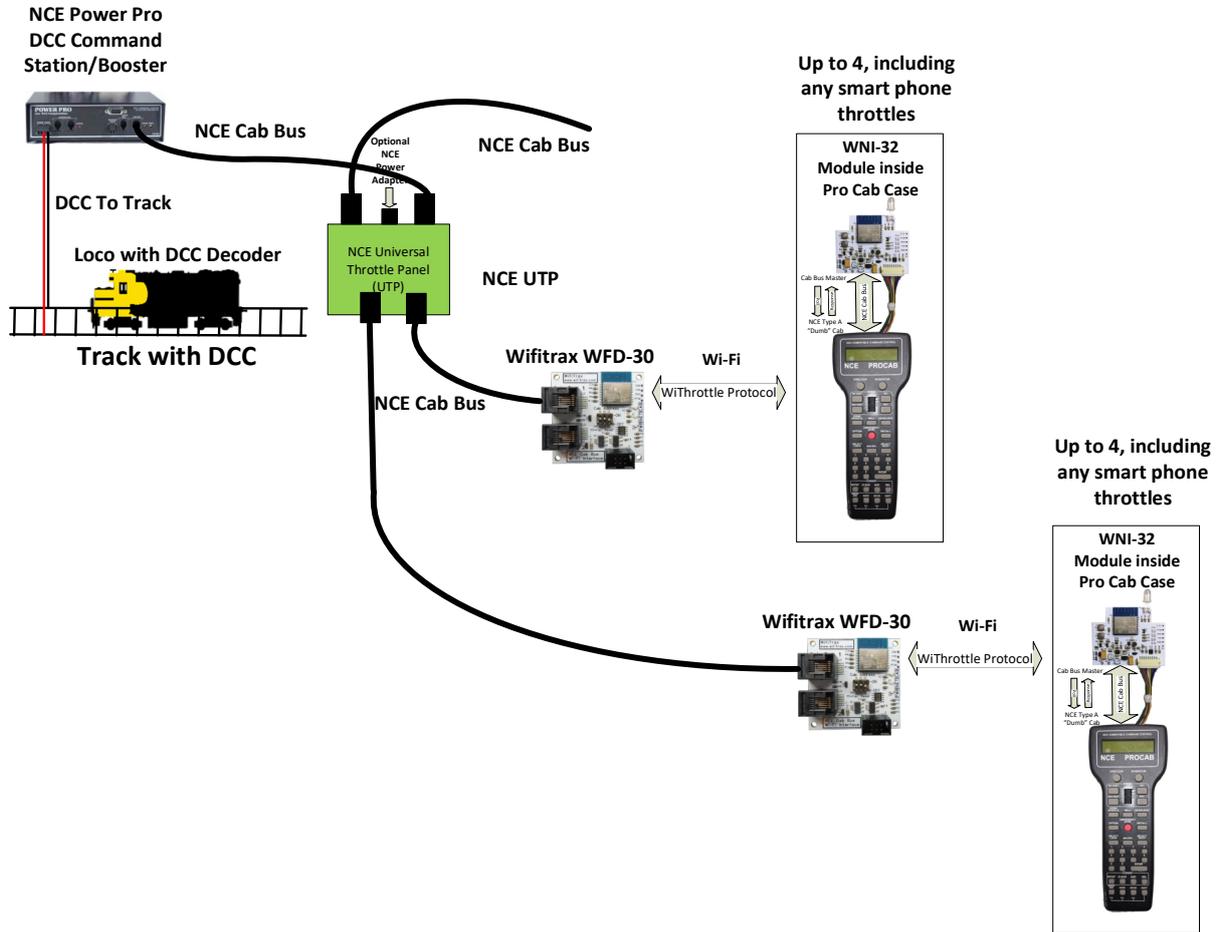


Figure 23 Multiple Wi-Fi Pro Cabs Connected to two WFD-30 and to an NCE Power Pro via an NCE UTP

Figure 23 shows a complex configuration, for a large multi-user layout, using two Wifitrax WFD-30, each connected to an NCE Universal Throttle Panel (UTP). Each WFD-30 can support a mix of up to four Wi-Fi Pro Cabs or Smart Phone Throttles/ More tethered cabs cab be added to the NCE Cab Bus using more NCE UTP modules.

The WFD-30 modules can either be on a Home Net, or they can work with Direct Wi-Fi Connection. Either way, manual network connection and/or manual WiThrottle Server Connection will be needed to configure the Wi-Fi Pro Cabs. Consult the section "Working on a Home Network".

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Wifitrax WFD-26, WFD-27, WFD-28, WFD-29 used with Wi-Fi Procab

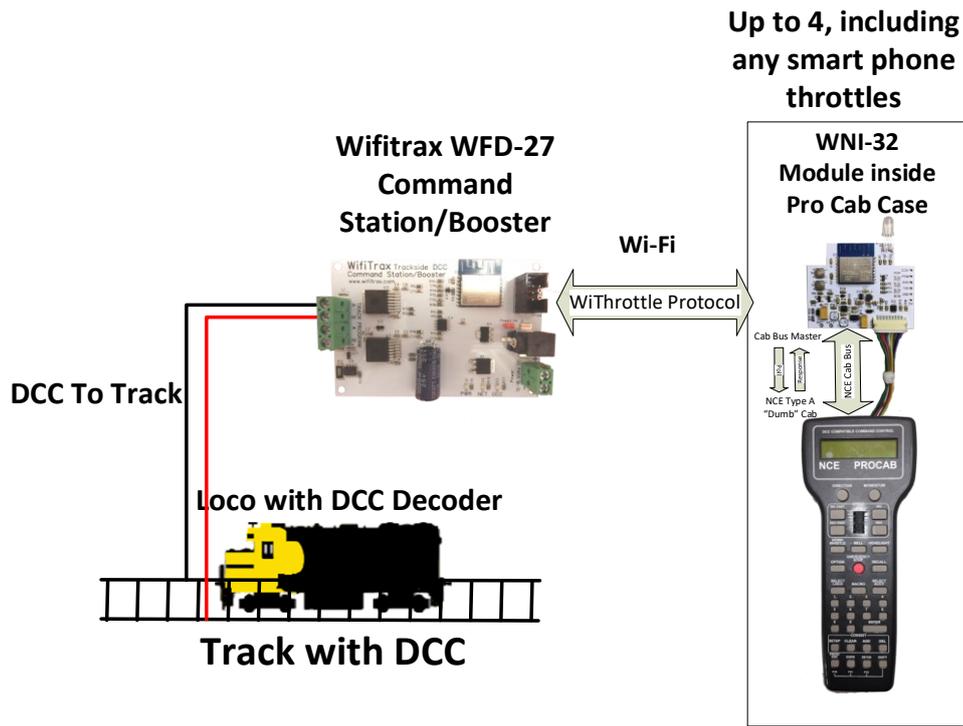


Figure 24 Wi-Fi Pro Cab used with a Wifitrax WFD-27 5 Amp Wi-Fi Command Station/Booster

Figure 24 shows a Wi-Fi Pro Cab, an NCE Pro Cab fitted with a Wifitrax WNI-32, working with a WFD-27 Wi-Fi 5 Amp Command Station/Booster. Up to a total of four such Wi-Fi Pro Cabs or Smart Phone Throttles can be connected. To add more throttles, use the WFD-26 or WFD-29.

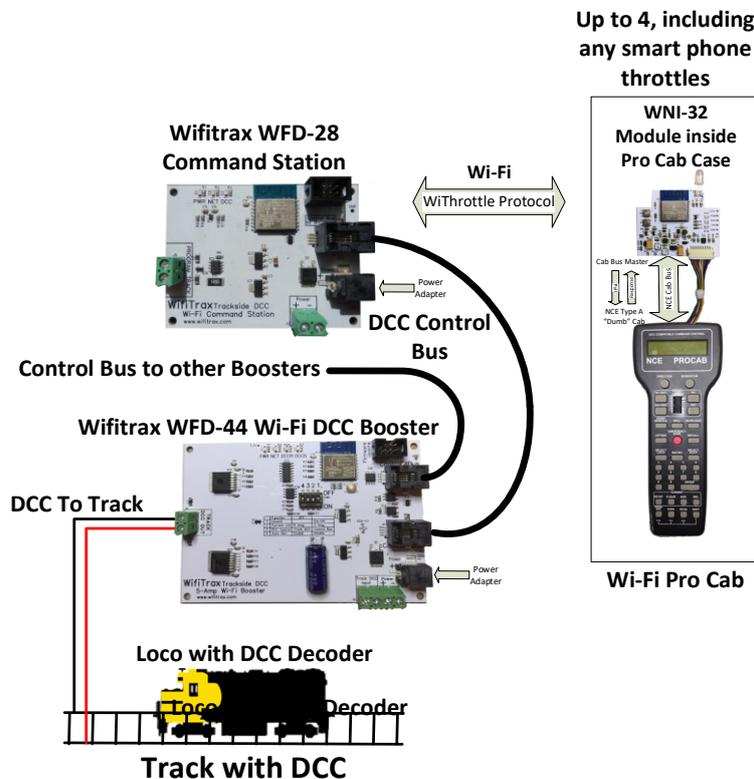


Figure 25 Wi-Fi Pro Cab used with a Wifitrax WFD-28 Wi-Fi DCC Command Station and WFD-44 5 Amp Wi-Fi DCC Booster

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Figure 25 shows a similar arrangement to Figure 24 but with a Wifitrax WFD-28 Command Station used with one or more Wifitrax DCC Boosters. The WFD-27 Command Station is connected to the boosters via a standard DCC Control Bus. It functions the same as WFD-27 as far as the Wi-Fi Throttles are concerned. A total of four Wi-Fi Pro Cabs (each with WNI-32) or Smart Phone Throttles may be used. If you want to add more than four throttles use the WFD-26 or WFD-29 and increase the number of WiThrottle Servers by adding WFD-30 modules. See Figure 26 and Figure 27.

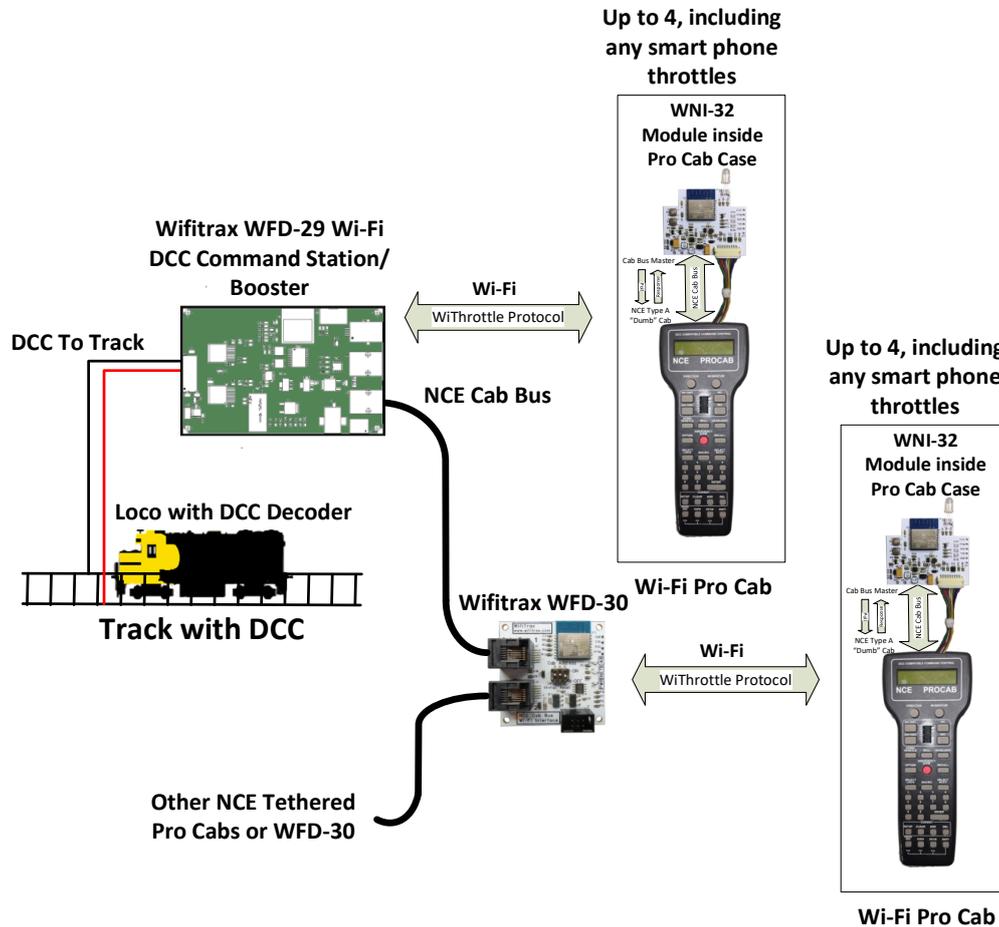


Figure 26 Wi-Fi Pro Cab used with a Wifitrax WFD-29 Wi-Fi DCC Command Station/Booster with NCE Cab Bus Support

Figure 26 shows Wi-Fi Pro Cabs used with the WFD-29 “Wi-Fi DCC Command Station/Booster with NCE Cab Bus Support” along with a WFD-30 connected to the WFD-29’s Cab Bus. The WFD-29 acts as a Cab Bus Master for the WFD-30 and any other Cabs connected on the Cab Bus. Tethered NCE throttles such as Pro Cab, Power Cab (in Pro Cab Mode), NCE Cab06 or other WFD-30 or WFD-31 may be connected. Up to 10 Cabs are supported. Each WFD-30 or WFD-31 can support a total of four Wi-Fi Pro Cabs or Smart Phone Cabs. The WFD-29 itself also supports up to a total of four Wi-Fi Pro Cabs or Smart Phone Cabs. The WFD-29, WFD-30 can be either on a home net or act as Direct Wi-Fi Access Points. The Wi-Fi Pro Cabs with their WNI-32 should be set up in Manual Mode and the Wi-Fi Network(s) and Wi-Throttle Servers selected as described in the section “Working on a Home Network”.

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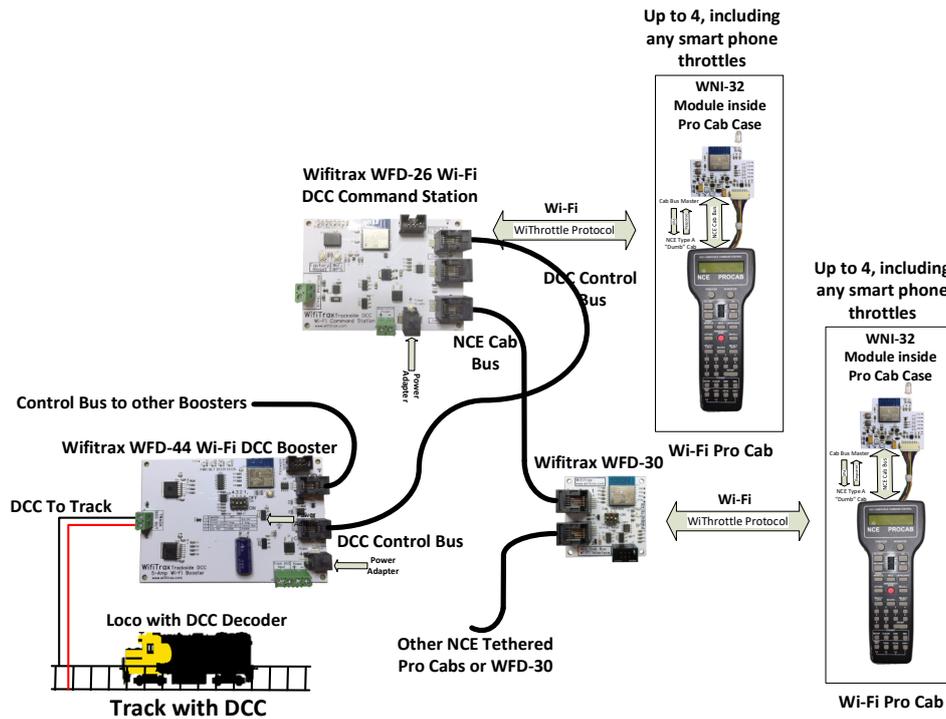


Figure 27 Wi-Fi Pro Cab used with a Wifitrax WFD-26 Wi-Fi DCC Command Station with NCE Cab Bus Support and WFD-44 5 Amp Wi-Fi DCC Booster

Figure 27 shows a similar configuration to Figure 26 except that the Wifitrax WFD-29 is replaced by a WFD-26 together with a Wifitrax WFD-44 Wi-Fi DCC Booster. The WFD-26 is a Command Station and outputs a DCC standard Control Bus to boosters, otherwise it is the same as WFD-29 supporting an NCE Cab Bus and acts as a Cab Bus Master for the WFD-30 and any other Cabs connected on its Cab Bus. Tethered NCE throttles such as Pro Cab, Power Cab (in Pro Cab Mode), NCE Cab06 or other WFD-30 or WFD-31 may be connected. Up to 10 Cabs are supported. Each WFD-30 or WFD-31 can support a total of four Wi-Fi Pro Cabs or Smart Phone Cabs. The WFD-29 itself also supports up to a total of four Wi-Fi Pro Cabs or Smart Phone Cabs. The WFD-26 and WFD-30 can be either on a home net or act as Direct Wi-Fi Access Points. The Wi-Fi Pro Cabs with their WNI-32 should be set up in Manual Mode and the Wi-Fi Network(s) and Wi-Throttle Servers selected as described in the section “Working on a Home Network”.

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JMRI Used with an NCE Command Station/Booster and Wi-Fi Pro Cabs

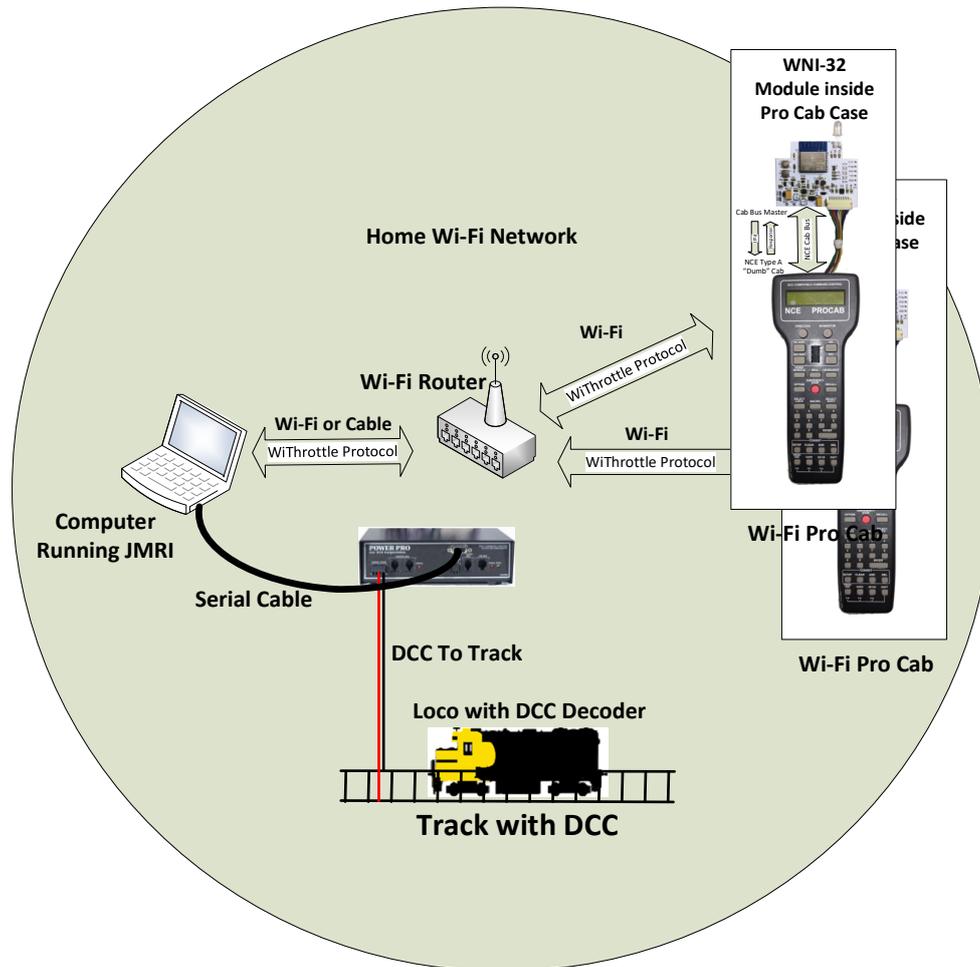


Figure 28 Wi-Fi Pro Cabs used with JMRI and an NCE Power Pro Command Station/Booster

Figure 28 shows a typical JMRI setup. JMRI is installed on the computer that is connected to a home Wi-Fi Network. The Computer with JMRI is connected via a Serial Cable to an NCE Power Pro Command Station/Booster. Typically, these Serial Cables connect to the computer using one of its USB connectors and there is an adapter built into the cable that converts to a Serial format for the NCE Power Pro.

The computer may be connected to the router either by ethernet cable or by Wi-Fi, but the throttles, be they Smart Phones or Wi-Fi Pro Cabs, must connect via Wi-Fi. After JMRI is run by starting Decoder Pro or Panel Pro, a WiThrottle Server must be started from the JMRI application. Once this is done, the WiThrottle Server running on the computer will be visible to the throttles via mDNS (Multicast Domain Name Service) which Smart Phone Throttle apps and the WNI32 in the Wi-Fi Pro Cab use. Please see the sections "Working on a Home Network" and "Working with JMRI" to see how to connect your Wi-Fi Pro Cab.

Note that this same setup will work with any DCC Command Station that will operate under JMRI. Different Command Station products will use different kinds of connections to the JMRI computer but the interface between the JMRI computer and the Wi-Fi Pro Cabs is the same.

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JMRI Used with WFD-26 or WFD-29 and Wi-Fi Pro Cabs

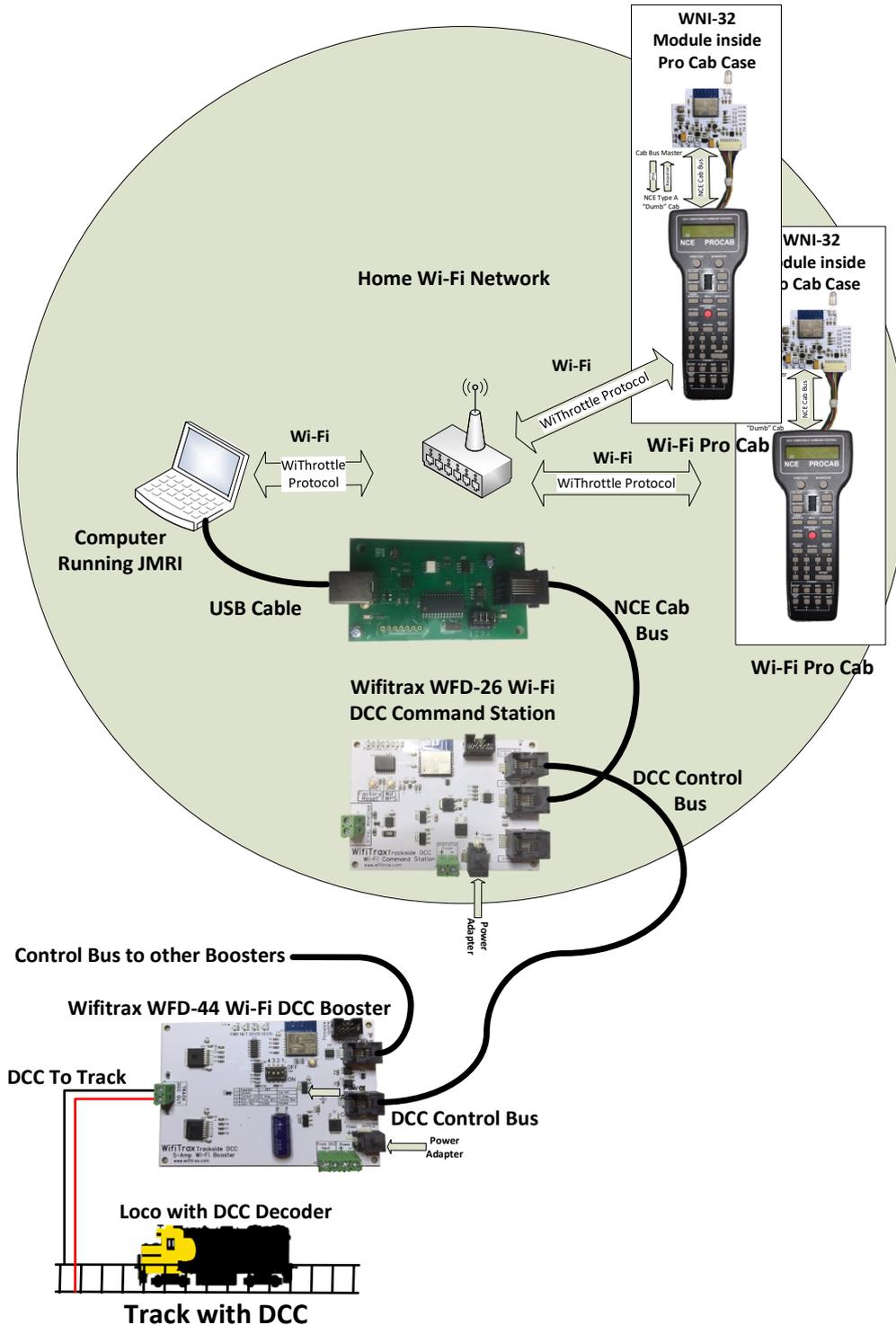


Figure 29 Wifitrax WFD-26 Used with NCE USB Module on its Cab Bus to operate with JMRI connected Wi-Fi Pro Cabs

Figure 29 shows a Wifitrax WFD-26 DCC Command Station used with an NCE USB Module to allow the WFD-26 to be used with Java Model Railroad Interface (called JMRI). JMRI is installed on a

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computer, shown in Figure 29, that is connected to a home network that has a Wi-Fi access point, shown in the figure. The computer may be connected to the router either by ethernet cable or by Wi-Fi, but the throttles, be they Smart Phones or Wi-Fi Pro Cabs must connect via Wi-Fi. After JMRI is run by starting Decoder Pro or Panel Pro, a WiThrottle Server must be started from the JMRI application. Once this is done, the WiThrottle Server running on the computer will be visible to the throttles via mDNS (Multicast Domain Name Service) which Smart Phone Throttle apps and the WNI32 in the Wi-Fi Pro Cab use. Please see the sections “Working on a Home Network” and “Working with JMRI” to see how to connect your Wi-Fi Pro Cab.

Once operational, JMRI works via the NCE USB module and the WFD-26 to communicate with the WFD-26 Command Station and so control trains on the DCC track via the WFD-44 Booster.

Wi-Fi Pro Cab used with Wifitrax Large Scale Wi-Fi Interface Modules WDMI-27, WDMI-32

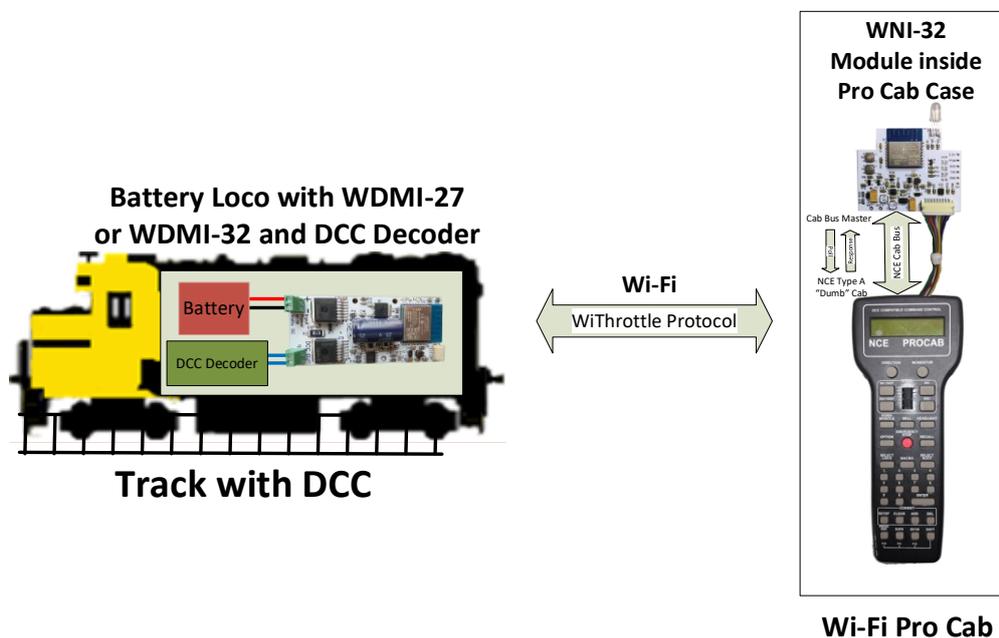


Figure 30 Battery Powered Large-Scale Locomotive fitted with WDMI-27 driven from Wi-Fi Pro Cab

Figure 30 shows a large-scale battery-powered loco fitted with a WDMI-27 and DCC Decoder controlled by a Wi-Fi Pro Cab. The Wi-Fi Pro Cab will need first to connect to the loco's Wi-Fi Access Point and then to the Loco's WiThrottle Server. This will happen automatically so long as that is the only loco that is powered when the Wi-Fi Pro Cab is turned on. If you have multiple powered locos, you will need to manually connect to the Wi-Fi Access Point (Network) of the required loco first and then the connection to the WiThrottle Server will take place automatically.

Although this will be workable, for multiple loco layouts, you will do better to place all the locos on a Home Network and use a WFD-60 as in the next section.

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Wi-Fi Pro Cab used with WFD-60 and Large-Scale Locos with Wi-Fi Interface Modules

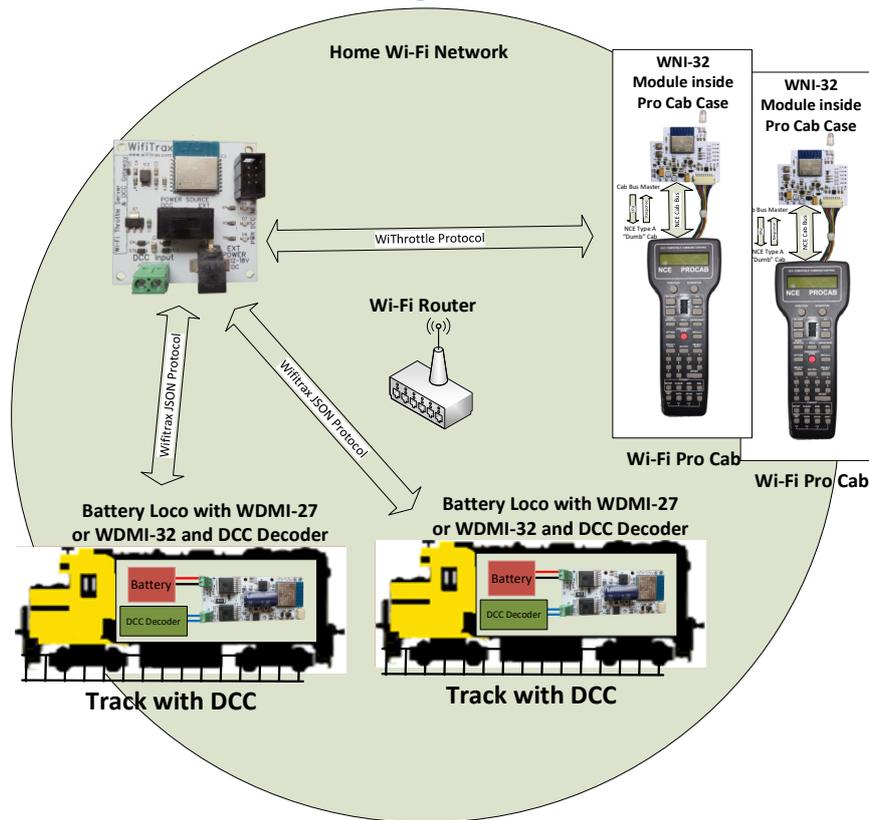


Figure 31 Using Wi-Fi Pro Cabs to drive several Large-Scale Battery Locos via a WFD-60

Figure 31 shows a Wifitrax WFD-60 used to control several large-scale battery locomotives, each fitted with a DCC Decoder and WDMI-27 Wi-Fi DCC Interface Module. The WFD-60 detects all these locos provided the locos and the WFD-60 itself are all on the home network. Customers with this setup will be driving trains using Smart Phones with apps such as Engine Driver or WiThrottle. The Wi-Fi Pro Cab with the WNI-32 will work in the same way, using the same WiThrottle Protocol to drive the locomotives as used by the Smart Phone apps. The total number of Smart Phones and Wi-Fi Pro Cabs must be limited to six. To increase the number, you can add another WFD-60.

When working like this, the WiThrottle Server in each WDMI-27 should be disabled using its Settings page. You should manually connect the WNI-32 in each Wi-Fi Pro Cab to your home network, then, when the WNI-32 in each Wi-Fi Pro Cab powers up, it will find the WFD-60 and connect to it.

If you have more than one WFD-60. You will need to manually choose the required WFD-60. See the sections "Working on a Home Network" and "Working with JMRI" to see how to do this.

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Working on a Home Network

If you have installed a Wifitrax product, such as WFD-30, on a home network you can use a Smart Phone to drive trains using an app such as Engine Driver or WiThrottle. You can also drive trains using an NCE Pro Cab fitted with the WNI-32. To do this, you first need to connect your Pro Cab to your home network, then connect to a WiThrottle Server such as the WFD-30 or JMRI.

Once it is connected to a Wi-Fi network, the WNI-32 is designed to automatically detect a WiThrottle Server using a protocol called Multicast DNS or mDNS for short. The apps Engine Driver and WiThrottle do the same thing.

But first you must connect to your home network which will usually have a password. The WNI-32 provides to methods:

- Wi-Fi Protected Setup (WPS),
- Manual Setup

Using Wi-Fi Protected Setup (WPS)

Wi-Fi Protected Setup is the easiest and you can use it if your home router supports WPS. Check the instructions for your router or look for a WPS button on the router itself. If your router supports WPS, you can connect your Pro Cab with WNI-32 by following this procedure:

Turn on your WFD-30 or other Wifitrax product that is on your home network, or start JMRI on your computer.

If you have turned your WNI-32 on for the first time and you have no Wifitrax product that is NOT connected to your network, your Pro Cab will show the displays below. Alternately.

T	U	R	N		O	N	A							
W	I	T	H	R	O	T	T	L	E		S	V	R	.

S	C	A	N	N	I	N	G		F	O	R				
W	I	F	I	T	R	A	X		D	E	V	I	C	E	S

Figure 32 The Pro Cab Startup Screens alternating when trying to connect

Since your Wifitrax WFD-30 or JMRI have a WiThrottle Server, you want the WNI-32 to find it but it cannot because it must first be connected to your home network. To do this press the EXPN button followed by ENTER 3 times to see the Network Screen as below

W	F	T	R	X	_	W	N	I	3	2	_	1	_	6	>
1	9	2	.	1	6	8	.	8	.	1					

Figure 33 Network Screen on Pro Cab in unconnected state

The top line means that the WNI-32 is connected only to its own Wi-Fi Network with the SSID wftrx_WNI32_1_XXXXXXXX_8, where XXXXXXXX is the serial number (the Pro Cab only has a 20-character wide screen but you can show the rest of the SSID by pressing the Momentum to scroll right and the Direction button to scroll left). The bottom line shows its IP Address on its own

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network which is always 192.168.8.1. To connect to your home network, first press 1 to display the Network Connect screen as below.

C	O	N	N	E	C	T		1	=	A	U	T	O		
2	=	M	A	N	U	A	L		3	=	W	P	S		

Figure 34 The Network Connect Screen

Press 3 to select the WPS option and the first WPS screen is displayed as below.

P	R	E	S	S		R	O	U	T	E	R		W	P	S
B	U	T	N	.		T	H	E	N		E	N	T	E	R

Figure 35 The first WPS Screen

Press the WPS button on your router. It will begin flashing which shows that it is allowing a device to connect using WPS. Now press ENTER on your Pro Cab to show the second WPS screen below:

W	A	I	T	I	N	G		F	O	R		W	P	S	
C	O	N	N	E	C	T	I	O	N	.	.	.			

Figure 36 The second WPS Screen

Now the WNI-32 is trying to join the Wi-Fi Network for your router. If successful, you will see the connecting screen in Figure 37 and the LED begin to flash white as the module attempts to find the first WiThrottle Server on your home network. Once it has found one and connected, the LED will show continuous white and the normal main screen will display.

W	A	I	T	I	N	G		F	O	R		W	P	S	
C	O	N	N	E	C	T	I	O	N	.	.	.			

Figure 37 The Network Connecting Screen

L	O	C	:			*	0		0	2	:	4	9	P	M
F	W	D	:		0	0	0		-	-	-	-	-	-	-

Figure 38 The WNI-32 Pro Cab Operating Screen

To check your Wi-Fi and WiThrottle connection, press the press the EXPN button followed by ENTER 3 times to see the Network Screen as below:

W	I	F	I	T	R	A	X	D	E	M	O	3			
1	9	2	.	1	6	8	.	3	.	4	9	/	4	7	

Figure 39 Network Screen on Pro Cab in Connected State

The top line shows the SSID of the Wi-Fi network to which the Pro Cab is connected, in the example, this is one of the Wifitrax test networks, WIFITRAXDEMO3. The bottom line shows the IP Address of the Pro Cab and the WiThrottle Server on that network to which the Pro Cab is connected. In this case the Pro Cab has IP Address 192.168.3.49 and the WiThrottle Server has IP Address

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192.168.3.47. The first three numbers of the IP Addresses are always the same, so the compact notation with the slash works.

Pressing ENTER again displays the WiThrottle Server Screen giving more details about the server at 192.168.3.47:

W	F	D	-	3	0	.	_	W	I	T	H	R	O	T	T
1	9	2	.	1	6	8	.	3	.	4	7				

Figure 40 Network Screen on Pro Cab in Connected State

Using Manual Network Setup

If your home network router does not support Wi-Fi Protected Setup (WPS), or for some reason it does not work, you can connect the WNI-32 to a home network manually. This requires you to know the SSID of your router's Wi-Fi Access Point and its password. To connect manually follow the following procedure:

- (1) Press EXTN, then ENTER three times to display the Network screen as below:

N	E	T		U	N	C	O	N	N	E	C	T	E	D	
P	R	O	T		U	N	C	O	N	N	E	C	T	E	D

Figure 41 Network Screen on Pro Cab in unconnected state

Press 1 to display the Network Connect screen as below.

C	O	N	N	E	C	T		1	=	A	U	T	O		
2	=	M	A	N	U	A	L		3	=	W	P	S		

Figure 42 The Network Connect Screen

Press 2 to enter Manual Network Connect mode. The SSID Select screen is displayed. It will briefly show a "Waiting for SSID" message then show a detected SSID on the first line with instructions on the second line. You can use the INC and DEC keys on the Pro Cab to scroll through the available networks to find the one to which you want to connect. Once you have the correct SSID visible, press 1 and the Password Screen displays.

W	I	F	I	T	R	A	X	D	E	M	O	3				
1	=	C	N	C	T					I	N	C	/	D	E	C

Figure 43 The Manual Network Connect SSID Select Screen

Since Wi-Fi passwords allow any character and the Pro Cab does not provide alphabetic character entry, the Password screen is rather complicated. The WNI-32 provides two ways of entering password characters:

- Use the INC/DEC keys to select a character and the BELL key to add it to the password
- Use the number keys for numbers, with multiple presses to select letters.

The upper line gives information and the lower line shows the password as currently entered.

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At the left of the upper line the SEL field shows the character selected for entry. This character will be added to the password if the BELL key is pressed. The Pro Cab screen does not display lower case characters, so the SEL: field shows UC or LC in front of the character to indicate if it is upper or lower case. For example UCA is Upper Case “A” and LCA is lower case “a”.

A cursor flashing on the lower line indicates the position in the password at which a character will be added.

On the upper line, to the right, the CUR: field shows the current character at the cursor position if there is one. So in the example below, the A under the cursor in the lower line is actually lower case “a”.

S	E	L	:	U	C	A		C	U	R	:	L	C	A	
M	Y	P	A	3	3	W	O	R	D						

Figure 44 The Manual Network Connect Password Screen

So you can enter a password using the Select method by using the INC and DEC keys to find the character you want to add, as shown in the SEL: field, taking care to find upper case or lower case as needed, then use the BELL key to add that character. Repeat until all the password characters have been entered. You can go back and review characters using the DIRECTION and MOMENTUM keys, DIRECTION for back and MOMENTUM for forward. The cursor will move and the character at that position will be shown in the CUR: field.

When you have finished press ENTER to connect to the network.

Alternatively, you can enter any alphabetic or numeric character using the number keys. Press any number key once to show the number, repeated presses cycle through six upper-case and lower-case letters. The letter or number being entered will show in the CUR: field. When you have the correct one, wait until the cursor moves to the next position. You can go back and review or change them using the DIRECTION and MOMENTUM keys.

The number and characters associated with the keys is below:

Pro Cab Key Label	1 st Press	2 nd Press	3 rd Press	4 th Press	5 th Press	6 th Press	7 th Press
1	1	A	B	C	a	b	c
2	2	D	E	F	d	e	f
3	3	G	H	I	g	h	i
4	4	J	K	L	j	k	l
5	5	M	N	O	m	n	o
6	6	P	Q	R	p	q	r
7	7	S	T	U	s	t	u
8	8	V	W	X	v	w	x
9	9	Y	Z	y	z		
0	0						

Table 2 Pro Cab Key assignments for multiple presses

When you have entered the password, you can use DIRECTION and MOMENTUM to move the cursor back and forward to check it.

When you are sure the password is correct, press ENTER to connect to the network.

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Working with JMRI

Java Model Railroad Interface (JMRI) is installed on a computer that would normally be connected to a network. To operate an app on a smart phone, such as WiThrottle (Apple) or Engine Driver (Android) the computer with JMRI must be connected to a router with a Wi-Fi access point to its network. This is what we call the Home Network in this document. When you start an instance of a WiThrottle Server on JMRI, using either Decoder Pro or Panel Pro for example, this appears as a WiThrottle Server in the same way as a Wifitrax product such as WFD-30.

You can therefore, of course use a Wi-Fi Pro Cab (a Pro Cab + WNI-32) with a JMRI WiThrottle Server on the same Home Network. JMRI simply takes the place of a Wifitrax product such as WFD-30.

To connect with JMRI, simply follow the same procedure as the previous section “Working on a Home Network”, but instead of turning on a WFD-30, run Decoder Pro or Panel Pro and start a WiThrottle Server.

Going through this same process, using WPF or manual network connection results in a Network Screen as below:

W	I	F	I	T	R	A	X	D	E	M	O	3			
1	9	2	.	1	6	8	.	3	.	4	9	/	1	0	1

Figure 45 Network Screen on Pro Cab in Connected State to JMRI

In this case the WNI-32 IP address is the same but the WiThrottle Server IP Address is 192.168.3.101.

Pressing ENTER again displays the WiThrottle Server screen. The name of the WiThrottle Server is the default JMRI “MY JMRI RAILROAD”.

M	Y		J	M	R	I		R	A	I	L	R	O	A	D
1	9	2	.	1	6	8	.	3	.	1	0	1			

Figure 46 Network Screen on Pro Cab in Connected State to JMRI

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Working with Multiple WiThrottle Servers on a Network

What if you have JMRI and a Wifitrax product on your network? What if you have more than one Wifitrax product on your network.

Examples of multiple WiThrottle Servers are:

- You have two WFD-30 modules connected to the same NCE Command Station
- You have a WFD-26 with a second WFD-30 connected
- You have JMRI connected via an NCE USB Module to a WFD-26

When you connect your Wi-Fi Pro Cab to your Home Network, it will connect automatically to the first WiThrottle Server that it finds by mDNS. If you have more than one device, this may be the wrong one. To connect to the required server, you can use manual WiThrottle setup.

Once your Wi-Fi Pro Cab is connected to your home network, press EXTN, then ENTER three times to see the Network Screen, then once more to view the WiThrottle Server Screen.

To change the WiThrottle Server press 1, which displays the WiThrottle Connect Screen as below:

W	I	T	H	R	O	T	.		S	E	R	V	E	R	
1	=	A	U	T	O		2	=	M	A	N	U	A	L	

Figure 47 WiThrottle Connect Screen

Press 2 to select manual mode. This causes the WNI-32 to perform a continuous sequence of mDNS queries to look for WiThrottle Servers on the Home Network, displaying them on the Pro Cab screen as below. Only one is displayed at a time and to sequence through them, press the INC or DEC button.

M	Y		J	M	R	I		R	A	I	L	R	O	A	D
1	9	2	.	1	6	8	.	3	.	1	0	1			

W	F	D	-	3	0	(4)	.	_	W	I	T	H	R
1	9	2	.	1	6	8	.	3	.	4	7				

Figure 48 WiThrottle Server Select

Once you have selected the required server, press 1 to connect. This will now be the server that the Wi-Fi Pro Cab always connects to on power up. Selecting Manual mode in this way disables the automatic selection of the first discovered WiThrottle Server. If you wish to use a different WiThrottle Server, go through the process again and either select Auto or choose a different server.

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Differences between the Pro Cab and the Wi-Fi Pro Cab

To be added.

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The WNI-32/Pro Cab Extension Screens

The WNI-32 needs to allow the user to control its Wi-Fi features from the Pro Cab screen. The NCE Radio Module uses the EXPN (Expansion) key to enter screens controlling the radio. The Wifitrax WNI-32 takes a similar approach but there are more features and screens. So to enter the screens that apply specifically to the WNI-32 Wi-Fi Interface, press the EXPN key. There is a sequence of screens available.

Expansion Screen 1 - Power

The first is the Power Screen shown in Figure 49. The top line has the title "POWER" followed by the present battery voltage. The Battery voltage is an approximate measurement, and serves as an indication of the charge level. The lower line gives guidance; pressing the key 1 will turn off the WNI-32 and thus the Pro Cab. Pressing 2 will display the status of all 28 Functions. Pressing ENTER will proceed to the next expansion screen.

P	O	W	E	R			B	A	T	:	5	.	0	1	V
1	=	O	F	F		2	=	F		E	T	R	=	N	X

Figure 49 The WNI-32 Expansion Screen - Power

Expansion Screen 2 – Reset

The Reset screen is shown in Figure 50. The top line shows the title, "RESET" followed by the serial number of the WNI-32 module. You cannot change this, but you may need to provide it if you need assistance from Wifitrax. The second line provides guidance. Press 1 to Factory Reset the module. Press ENTER to continue to the next screen without a reset.

R	E	S	E	T		S	N	6	0	2	0	0	1	0	4
1	=	R	S	T		E	N	T	E	R	=	N	E	X	T

Figure 50 Expansion Screen – Reset

Expansion Screen 3 – Power Timer

The Power Timer screen shown in Figure 51 The top line shows the title, "PWR TMR" followed by the Firmware Version of the WNI-32 module. You cannot change this, but you can update the firmware using a Firmware Update Module from Wifitrax and the Wifitrax Workshop Software on Windows. The second line provides guidance. Press a digit key 0 to 9 if you want to change the Power Down Time in minutes (0 = Never Power Down). Otherwise press ENTER to skip to the next screen without changing the Power Down Time.

P	W	R		T	M	R		V	1	.	0	.	1	2	
0	-	9		M		E	N	T	E	R	=	S	K	I	P

Figure 51 Expansion Screen – Auto Power Down Time

Expansion Screen 3 – Network Connection Screen

The Network Connection screen is shown in Figure 52, The top line shows the SSID of the Wi-Fi network to which the WNI-32 is connected and the bottom line shows the IP Address on that network. The Pro Cab only has a 20-character wide screen but you can show the rest of the SSID by pressing the Momentum to scroll right and the Direction button to scroll left.

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W	F	T	R	X	_	W	F	D	3	0	_	1	_	3	>
1	9	2	.	1	6	8	.	7	.	2	/	1			

Figure 52 Expansion Screen – Wi-Fi Network Connection

If the module has just been reset and has not automatically connected to another network it will be connected only to its own Wi-Fi Network with the SSID wftrx_WNI32_1_XXXXXXXX_8, where XXXXXXXX is the serial number and the bottom line shows its IP Address on its own network which is always 192.168.8.1.

If the WNI-32 has automatically connected to a WFD-30, like Figure 2 for example, that is operating in Direct Mode, this screen will appear as Figure 52, the top line shows the SSID of the WFD-30 (wftrx_WFD30_1_XXXXXXXX_7) and the lower line the IP Address of the WNI-32 on the WFD-30 module's network. Remember to use the Momentum and Direction buttons to scroll left and right for the SSID. The number after the slash on the lower line is the last digit of the IP Address of the WiThrottle Server to which the WNI-32 is connected, 1 in this case, so the IP Address of the WFD-30 in Direct Mode, on its own network is 192.168.7.1 and the IP Address of the WNI-32 on the network belonging to the WFD-30 is 192.168.7.2.

If you want to change the Wi-Fi connection press the key "1". For the simplest case, as Figure 2 for example, Wi-Fi connection is automatic, but if you have more than one WFD-30 on your layout, or if you have one or more WFD-30 on a home network using your own router, you will need to change the Wi-Fi connection so press 1 to display the Wi-Fi Connection Change screen as Figure 53.

C	O	N	N	E	C	T		1	=	A	U	T	O		
2	=	M	A	N	U	A	L		3	=	W	P	S		

Figure 53 Expansion Screen – Wi-Fi Network Connection Change

There are three ways that the WNI-32 can establish a Wi-Fi connection:

- Automatic (AUTO)
- Manual
- Wi-Fi Protected Setup (WPS)

Automatic mode means that the module will automatically look for Wi-Fi Access Points provided by Wifitrax modules that support WiThrottle protocol and will automatically connect to the first one that it finds. Once connected, the module will remember the connection and will always connect to the same Wi-Fi Access Point each time it is powered up. This covers the simplest situation in Figure 2 and makes life very easy for first-time users. Later, on power up, if the remembered connection is not available for some reason, your WNI-32 will look for a new one, connect and remember that. So if you have taken your Wi-Fi Pro Cab (Pro Cab + WNI-32) to a club or friend's house, you should connect automatically. This is great provided you don't care which Wifitrax product you connect to and your WFD-30 or other Wifitrax WiThrottle Server product does not have a password and is NOT on a home network. In automatic mode, the WNI-32 will NOT connect to your home network.

To select Automatic mode, simply press 1 and your WNI-32 will do the rest.

Manual mode means that you must select a Wi-Fi Network that you want to connect to by choosing its SSID and entering the password manually. This allows you to connect to your home or club network, or to a WFD-30, WFD-31 etc. for which you have set a password.

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To use Manual mode, press 2 and work through the next screens.

Wi-Fi Protected Setup (WPS) means that you can connect to a secure home network without providing a password (Look up WPS on the internet to find out more). You can use this if your router has a WPS Button.

To use WPS, press 3 to see the WPS screen as Figure 54. Then press the WPS button on your router. The button should begin flashing depending on your router. Now press Enter on your Pro Cab to see the screen as Figure 55.

P	R	E	S	S		R	O	U	T	E	R		W	P	S
B	U	T	N	.		T	H	E	N		E	N	T	E	R

Figure 54 The first WPS Screen

W	A	I	T	I	N	G		F	O	R		W	P	S	
C	O	N	N	E	C	T	I	O	N	.	.	.			

Figure 55 The second WPS Screen

Once your WNI-32 in your Pro Cab has successfully negotiated with your router, the Pro Cab will show a connecting message and establish a connection with the first WiThrottle Server it sees on your home network.

The Manual Wi-Fi Connection Screens

Going back to manual mode, if you select 2 in Figure 53, you will see the manual Wi-Fi Connection Screen as Figure 56

W	A	I	T	I	N	G		F	O	R		S	S	I	D
1	=	C	N	C	T				I	N	C	/	D	E	C

Figure 56 The Manual Network Connect SSID Select Screen before scanning is complete.

After a period of time, this screen will be updated to show the SSIDs that are detected, as Figure 57. Since only one line is available, only one can be displayed at a time. To see more SSIDs use the INC and DEC keys. In as Figure 57 a Wifitrax test network is displayed, Wifitraxdemo3.

W	I	F	I	T	R	A	X	D	E	M	O	3			
1	=	C	N	C	T				I	N	C	/	D	E	C

Figure 57 The Manual Network Connect SSID Select Screen after at least one SSID has been found.

Once the SSID of the desired network has been found, press 1 to initiate connection. The password screen is then displayed as Figure 58.

S	E	L	:	S	P	C		C	U	R	:	S	P	C	

Figure 58 The Manual Network Connect Password Entry Screen

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Since Wi-Fi network passwords can contain almost all characters and the Pro Cab only has a numeric keypad, the use of this screen is rather complicated. It is described fully in the section “Using Manual Network Setup” and that description will not be duplicated here. Because of the difficulty of using this screen, you are advised to use WPS where possible.

Returning to Expansion Screen 3 – Network Connection, if you don’t want to change the network connection, pressing Enter again will display the next screen.

Expansion Screen 4 – WiThrottle Server Connection Screen

It is possible for more than one WiThrottle Server to be present on a network. This screen shows the WiThrottle Server to which the WNI-32 is currently connected, as Figure 59.

S	N	3	3	1	0	0	4	1	7	.	_	W	I	T	>
1	9	2	.	1	6	8	.	7	.	1					

Figure 59 The WiThrottle Server Connection Screen

Only 16 characters are available on the upper line, so the WiThrottle Server Name can be viewed piece by piece by pressing the Momentum and Direction buttons to scroll forward and backward respectively.

This screen is the entry point for the sequence of screens allowing you to manually select a specific WiThrottle Server on the network. This operation is described in the section “Working with Multiple WiThrottle Servers on a Network” and it will not be repeated here.

If changing the WiThrottle Server is not required, press Enter to leave the Expansion Screens.

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The WNI-32 Web Pages

To be added.

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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 appareil 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.

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EU Declaration of Conformity for WNI-32

1. Radio equipment: WifiTrax Model WNI-32 Wi-Fi Insert Module for NCE Cabs Operating Manual.

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 WNI-32 Wi-Fi Insert Module for NCE Cabs Operating Manual as pictured in **Error! Reference source not found.** and identified by a label on underside of module bearing the model number WFD-26.

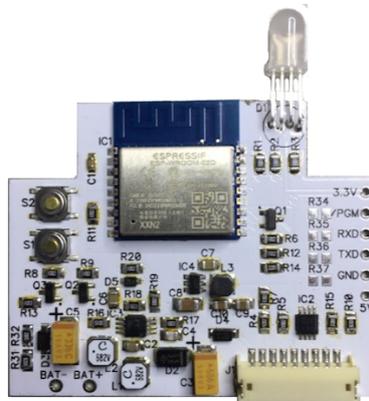


Figure 60 Identifying Illustration for WifiTrax Model WNI-32 EU Declaration of Conformity

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 May 24, 2024, Berowra NSW Australia

WNI-32 Wi-Fi Insert Module for NCE Cabs Operating Manual

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