Raspberry Pi 2 Model B and JMRI for Wired Connection to Router/Access Point for Pi-SPROG One and Pi-SPROG Nano 2016-11-25-raspian-jessie build

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These instructions describe the process of setting up a Raspberry Pi 2 or 3 Model B to use a wired connection to a wireless router that will be used as an access point (AP) for connection by handheld devices running WiThrottle, EngineDriver or other similar apps.

If you have downloaded or purchased the image on SD card from SPROG DCC then you do not need these instructions, other than for reference.

Some familiarity with the Raspberry Pi and Linux operating system is assumed, especially the use of the command line in a terminal and simple editors such as vi or nano.

Where we say "we like..." in the following instructions, we indicate how our SPROG DCC pre-built card images are made. These steps can be tailored by more advanced users to your own preference.

Hardware Requirements

Raspberry Pi 2 or 3 model B and suitable power supply for above

MicroSD memory card (8Gb recommended)

Pi-SPROG One and power supply

Host PC (Windows or Linux)

Wired network connection from the R-Pi to your router.

Software Requirements

SSH client installed on the host. These instructions assume the use of putty.exe <u>http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html</u> on Windows.

VNC Viewer installed on the host, https://www.realvnc.com/download/viewer/

Create the SD Card Image

Start with the latest Raspbian Jesse image (2016-11-25 at the time of writing) installed on an SD card. See <u>https://www.raspberrypi.org/documentation/installation/installing-images/README.md</u>

Create a file named ssh in the boot partition to enable SSH. With a windows host do this by viewing the contents of the SD card in Windows Explorer, right click, New Text Document and change the name to ssh. This will enable SSH and allow us to proceed to the next step.

Put the SD card in the R-Pi's SD card slot and connect power to the R-Pi.

Connecting With SSH

Determine the IP address assigned to the R-Pi by your router. We recommend using your router setup to assign a static IP address to the R-Pi. You will need to refer to your particular router's instructions for this.

Use the IP address in putty to connect to the R-Pi using SSH.

🕵 PuTTY Configuration	×
 PuTTY Configuration Category: Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Colours Connection Data Proxy Telnet 	Basic options for your PuTTY session Specify the destination you want to connect to Host Name (or IP address) Port 192.168.1.10 22 Connection type: Raw Raw Telnet Rogin SSH Saved Sessions Default Settings Load Save Delete
⊷ Proxy ⊷ Telnet ⊷ Rlogin ⊛- SSH ⊷ Serial	Close window on exit: Always Never Only on clean exit
About	<u>O</u> pen <u>C</u> ancel

Click Yes if presented with a security alert.



When prompted enter the default user name 'pi' and password 'raspberry'



Note the warning message "SSH is enabled ..."

We strongly recommend that you change the password before proceeding, especially if you intend making your R-Pi visible on the Internet.

Bold Consolas font text indicates text that is typed at the R-Pi command line in an SSH shell, or a desktop terminal window.

Indented Bold Consolas font text indicates text that is entered in text editor.

Ensure you have the latest updates.

sudo apt-get update

and then

sudo apt-get dist-upgrade

The updates may take a little time. Answer yes if prompted to continue.

Reboot your R-Pi.

sudo reboot

Close the putty window and then reconnect (with putty) once the R-Pi has rebooted.

Enable VNC

To allow remote access to to virtual desktop, rather than the SSH command line, we need to enable VNC which is included with the Raspian distribution. Use the raspi-config utility.

sudo raspi-config

🧬 pi@raspb	errypi: ~		_	\times
				^
	Raspberry Pi Software Confi	iguration Tool (raspi-config)	
1 Exp	and Filesystem B	Ensures that all of the SD c	ard s	
2 Cha	nge User Password (Change password for the defa	ult u	
3 Boo	t Options (Configure options for start-	up	
4 Loc	alisation Options S	Set up language and regional	sett	
5 Int	erfacing Options (Configure connections to per:	ipher	
6 Ove	rclock (Configure overclocking for y	our P	
7 Adv	anced Options (Configure advanced settings		
8 Abo	ut raspi-config 1	Information about this confi	gurat	
	<select></select>	<finish></finish>		
1 Exp 2 Cha 3 Boo 4 Loo 5 Int 6 Ove 7 Adv 8 Abo	Raspberry Pi Software Confi and Filesystem E nge User Password () t Options () alisation Options () erfacing Options () rclock () anced Options () ut raspi-config () <select></select>	iguration Tool (raspi-config Ensures that all of the SD configures options for start- Configure options for start- Set up language and regional Configure connections to per Configure overclocking for your Configure advanced settings Information about this confict <finish></finish>) ard s ult u sett ipher our P gurat	

Use the cursor keys to select Interfacing Options and enable VNC.

Exit raspi-config.

Next we will change the screen resolution for the virtual desktop.

sudo nano /boot/config.txt

Scroll to the end of the file and add the following lines for 1280x800 resolution.

```
hdmi_force_hotplug=1
hdmi_ignore_edid=0xa5000080
hdmi_group=2
hdmi_mode=28
```

Save the file and quit the editor.

See

https://support.realvnc.com/knowledgebase/article/View/523?_ga=1.23202815.450528412.148088 0479 for the possibilities. See https://www.raspberrypi.org/documentation/configuration/configtxt.md for other options.

Reboot your R-Pi.

sudo reboot

Connecting With VNC

Start VNC viewer on the host PC. Enter the IP address and click Connect.

V2 VNC Viewer	– 🗆 X
VNC® Viewer	Ve
VNC Server: 192.168.1.10	~
Encryption: Let VNC Server choose	~
About Options	Connect

The first time you connect you will see an identity check

V2 VNC Viewer	- Identity check		
	? VNC Server not recognized		
VNC Viewer ha	as no record of connecting to this VNC Server, so its t be checked.		
VNC Server:	192.168.1.10::5900		
Catchphrase:	Moment buffalo powder. Lunar canal giant.		
Signature:	7f-49-e0-eb-82-d5-16-af		
Are you sure you want to connect? You won't be warned about this again.			
	Continue		

Enter the username and password

V2 VNC Viewe	V2 VNC Viewer - Authentication			
VNC Server:	192.168.1.10::5900			
Username:	рі			
Password:	•••••			
Catchphrases	Moment buffalo powder. Lunar canal giant.			
Signature:	7f-49-e0-eb-82-d5-16-af			
	OK Cancel			

If you have not changed the default password, you will see a warning message each time you connect



R-Pi Configuration

Click the Raspberry logo and select Preferences -> Raspberry Pi Configuration

	Raspberry	Pi Configuratio	on 🗕 🗆 🗙
System	Interfaces	Performance	Localisation 🕅
Filesystem:			Expand Filesystem
Password:			Change Password
Hostname:		raspberrypi	
Boot:		⊙ To Desk	top 🔍 To CLI
Auto Login:			🗹 Login as user 'pi'
Network at Boot			Wait for network
Splash Screen:		 Enabled 	O Disabled
Underscan:		 Enabled 	O Disabled
		С	ancel OK

Change the Hostname (optional, useful if you have more than one R-Pi). We use sprog-pi for our images.

Click OK, then click No to postpone the reboot.

UART setup

We need to edit the command line to prevent the Kernel using the UART at startup. Open a terminal and type

sudo nano /boot/cmdline.txt

Remove 'console=serial0,115200' noting that this file must contain only one line. Be careful not to split the line when editing it.

Save the file and quit the editor.

Reboot your R-Pi. Close the VNC window.

Reconnect using VNC once the R-Pi has rebooted.

Check that the UARTs are mapped correctly, open a terminal and type

ls -1 /dev/ser*

The output should be something like

lrwxrwxrwx 1 root root 5 Dec 13 13:34 /dev/serial0 -> ttyAMA0

Install a terminal Emulator for SPROG Command Line Access

We like to do this for testing purposes, but it is entirely optional.

sudo apt-get install minicom

Answer yes if prompted to continue.

Shutdown your R-Pi.

Connect the SPROG-Pi and its power supply.

Start your R-Pi.

You can communicate with the Pi-SPROG using Mincom:

minicom --device=/dev/serial0 --baud=115200

As an example, type carriage return a couple of times to get the SPROG prompt 'P> ' then type a ? followed by carriage return to see the Pi-SPROG version.



To exit minicom type control-A X then select yes.

You only need to use minicom for diagnostics such as checking that he Pi-SPROG is working. From now on all other communication with the Pi-SPROG will be handled by DecoderPro.

Download and Install JMRI

Using the R-Pi web browser, navigate to <u>www.jmri.org/download/index.shtml</u> and download your chosen JMRI version and extract the archive to /home/pi/ or your preferred location.

Open the Downloads folder in File Manager, right click the downloaded archive and Extract To...



Change the path to your chosen location.

If extracted to /home/pi then the path to the application will be /home/pi/JMRI which we use in the following instructions.

Create a desktop icon for DecoderPro in an editor

```
sudo nano /home/pi/Desktop/DecoderPro.desktop
```

```
[Desktop Entry]
Type=Application
Encoding=UTF-8
Name=DecoderPro
Comment=JMRI DecoderPro
Icon=/home/pi/JMRI/resources/dp3_48x48.gif
Exec=/home/pi/JMRI/DecoderPro
Terminal=false;
```

Save the file and quit the editor.

Start DecoderPro by double clicking the new icon.

Create a new profile by selecting SPROG DCC as the System and Pi-SPROG One Command Station as the System connection. Select /dev/ttyAMA0 as the Serial port.

÷	Decoder P	ro Wizard	_ □	×
	Select your DC	CC Connection		
	System manufacturer			-
JMRI	System connection Pi-SPI Settings	ROG One Command Station 👻		-
First select the manufacturer of your DCC system	Serial port:	/dev/ttyAMA0	-	
Followed by the type of connection being used.	Connection Prefix Connection Name	S LOG One Command Station		
Finally select the serial port or enter in the IP address of the device	Additional Connection) Settings		
		< Back Next >	Cancel	

Once DecoderPro is running edit the preferences, config profiles and select "Automatically start application with last used last profile".

			Prefere		_ C	×
Window Help						
Connections Defaults	Config Profiles	Search Paths				_
File Locations	1	Name	Path	Status		
Start Up	My JMRI Railroad		/home/pi/.jmri/My_JMRI_Railroad	Current active profile		
Display						
Roster						
Throttle						
WiThrottle						
Config Profiles						
Railroad Name						
Web Server						
SRCP Server						
Simple Server						
Warrants						
	Activate	Add Existing	New Copy Export	•	Delete	
4	Automatically	y start application	with last used profile.			
Save	\bigcirc Show profile selector for 10 seconds before starting with last used profile.					

Start Withrottle server automatically

Edit DecoderPro preferences, WiThrottle, Start automatically on port 12090.

	Preferences	_ = ×
Window Help		
Connections Defaults File Locations Start Up Display	eStop Use eStop Seconds until eStop	
Messages Roster Throttle WiThrottle Config Profiles	Function Buttons	
Railroad Name JSON Server Web Server SRCP Server Simple Server	Network	
warrants ↓ ↓ ↓ Save	Allowed Controls ☑ Track Power ☑ Turnouts ☑ Routes ☑ Consists ○ DCC Brand-Specific	

Save the preferences and restart DecoderPro.

The WiThrottle server should start with DecoderPro and you should now be able to connect to it using e.g., WiThrottle or EngineDriver apps via your WiFi router.

Run DecoderPro at Startup

In a terminal open the session autostart file

```
sudo nano /home/pi/.config/lxsession/LXDE-pi/autostart
```

Add the following line, with the path to the location where you installed DecoderPro

@/home/pi/JMRI/DecoderPro

Save the file and quit the editor.

Reboot your R-Pi.

JMRI and WiThrottle server should start up automatically.

That's it! You are now setup to drive your trains.