https://www.halvorsen.blog



Raspberry Pi - Remote Access Alternatives

Hans-Petter Halvorsen

Remote Access to Raspberry Pi

Your PC



You can use your Raspberry Pi in the same way as a desktop computer by connecting it to an external Monitor, Keyboard and Mouse, but very often you want to connect to your Raspberry Pi <u>remotely</u> where your Raspberry Pi acts like a server and performing some tasks without the need of monitor, keyboard and mouse. This Tutorial will go through some alternative approaches for remote access to the Raspberry Pi from your PC.

Remote Access Alternatives

In this Tutorial we will explore different alternatives to remotely connect to our Raspberry Pi:

- <u>Secure shell</u> (SSH) network protocol
- Virtual Network Computing (VNC)
- <u>Remote Desktop Protocol (RDP)</u>
- <u>TeamViewer</u>

I guess there are other alternatives as well

https://www.halvorsen.blog



Prepare your Raspberry Pi

Hans-Petter Halvorsen

Table of Contents

Setting up a Mobile Hotspot WiFi Network

\leftarrow Settings		- 🗆 X
命 Home	Mobile hotspot	
Find a setting	Share my Internet connection with other devices	Related settings
	Off Off	Change adapter options
Network & Internet		Network and Sharing Center
🔁 Status	Share my Internet connection from Wi-Fi \checkmark	Windows Firewall
<i>ſſ</i> ≈ Wi-Fi	Share my Internet connection over	Help from the web
문 Ethernet	• Wi-Fi	Setting up mobile hotspot
ි Dial-up	O Bluetooth	Get help
% VPN	Network name:	
r∯≻ Airplane mode	Network password: Network band: 2.4 GHz	You cannot connect to your Eduroam

smartphone.

Network, but other networks may work fine.

You can easily configure a Mobile Hotspot

WiFi Network in Windows 10/11 or on your

(y) Mobile hotspot

Edit

Proxy

Raspberry Pi OS

- In order make your Raspberry Pi up and running you need to install an Operating System (OS)
- The OS for Raspberry Pi is called Raspberry Pi OS
- Raspberry Pi runs a version of an operating system called Linux (Windows and macOS are other operating systems).
- To install the necessary OS, you need a microSD card
- Then you use the Raspberry Pi Imager in order to download the OS to the microSD card from your PC

https://www.raspberrypi.org/software/

Raspberry Pi Imager

		🖉 Raspberry Pi Imager v1.4		- 🗆 X					
		R	aspberry	Pi	Raspberry Pilmager v1.4		Spberry Pi	×	
		Operating System	SD Card						
		CHOOSE OS	CHOOSE SD CARD	WRITE		Operating System RASPBERRY PI OS (32-BIT)	SD Card SDHC CARD	WRITE	
🍯 Rasp	berry Pi Imager v	v1.4	— 🗆 🗙 🕉 Ra	ispberry Pi Imager v1.4					
٢	*	Operating System Respherry PI OS (32-bit) A port of Debian with the Raspberry PI Desktop (Recommended)	x	SD Card SDHC Card - 32.0 GB Mounted as D\	_				
L	V	Released: 2020-08-20 Online - 1.1 GB download Raspberry PI OS (other) Other Raspberry PI OS based images	>		•				
		LibreELEC A Kodi Entertainment Center distribution	>		h	ttps://www.rock	aborryni org	/coftware/	
		Course Choose from Ubuntu Desktop, Server, and Core images RetroPie Turn wurr Daenharry Bi into a retro-semino machine	> >		<u>11</u>		<u></u>		

https://www.halvorsen.blog

Alternative 1

Secure shell (SSH) network protocol

Hans-Petter Halvorsen

Table of Contents

Alternative 1: SSH + Putty

- Secure shell (SSH) is a <u>network protocol</u> that is used when you want to get access to the <u>Command Line/Shell/Terminal</u> on another Computer (Raspberry Pi in this case).
- Raspberry Pi supports the SSH protocol.
 - You need to enable it (see next page) due to security reasons.
- **PuTTY** is a free and open-source terminal software that supports the SSH protocol.

- You need to install the Putty software on your PC.

 The "drawback" with this alternative is that you don't interact using a graphical user interface, only text-based commands

Remote Access using SSH



Enabling SSH on Raspberry Pi

Alternative 1: <u>Before</u> you start installing the Raspberry Pi OS using the Raspberry Pi Imager (Advanced Options)

🅉 Raspberry Pi Imager v1.7.3	-		×
Advanced options	x		
Image customization options for this session	n only 👻		
Set hostname: raspberrypi .local		۰.	
Enable SSH			
Use password authentication			
O Allow public-key authen Mal	ke sure to se	t up	
Set upgraphs and paceword	i credentials	also	
SAVE		3	
With this alternative there is no need for			
external Monitor, Keyboard and Mouse			

Alternative 2: <u>After</u> you have installed the Raspberry Pi OS and starting it up by connection a Monitor, Keyboard and Mouse

Raspberry Pi Configuration 🗸 🔺 🗙							
System	Display	Interfaces	Performance	Localisation			
Camera:		۲	Enable	🔿 Disable			
SSH:		0	Enable	• Disable)		
VNC:		\bigcirc	Enable	 Disable 			
SPI:		۲	Enable	\bigcirc Disable			
I2C: Serial P Serial C 1-Wire:Menu > Preferences > Raspberry Pi Configuration > Interfaces and make soure SSH is set to Enable							
I2C: M Serial PC Serial CC 1-Wire: SU	enu > P onfigura ire SSH i	referen tion > I is set to	ices > Ra nterface Enable	aspberr es and i	y Pi make		
I2C: Serial PC Serial CC 1-Wire: Remote GPIO:	enu > P onfigura ire SSH i	referen tion > I is set to	ices > Ra nterface Enable	es and i	y Pi make		

PuTTy

Enter IP Address or Name of the Raspberry Pi device you want to connect to

- PuTTY is a free and opensource terminal software.
- It supports several network protocols, including SSH.
- We install it on our PC to get remotely access to the Terminal window on Raspberry Pi

https://www.putty.org/

RuTTY Configuration			? ×		
Category:					
Session	Basic opti	ns for your Pu	TTY session		
	Specify the destination you want to connect to				
	Host Name (or IP address) Port				
Bell			22		
Features	Connection type:				
⊡. • Window		I Other:	Telnet ~		
- Appearance					
Translation	Load, save or delete a stored session				
	Saved Sessions				
Colours					
	Default Settings		Load		
Data			Save		
The SSH			5470		
Serial			Delete		
- Telnet					
Riogin	a	-			
SUPDUP	Close window on ex	it: ever On	ly on clean exit		
			ly on order over		
About Upb		0	Canad		
About Help		Open	Cancel		

🛃 login as: pi

- 🗆 X			
🖉 pi@raspberrypi: ~	_		×
🛃 login as: pi 🛃 pi@192.168.137.213's password: Linux raspberrypi 5.15.61-v71+ #1579 SMP Fri Aug 26 11:13:03 BST 2022 arm	nv71		~
The programs included with the Debian GNU/Linux system are free software, the exact distribution terms for each program are described in the individual files in /usr/share/doc/*/copyright.	;		
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law. Last login: Thu Sep 22 02:34:52 2022			
pi@raspberrypi:~ \$			
Now you are ready to interact and configure your Raspb and you can run all kinds of commands, install software,	erry etc.	Pi	

Type **exit** in order to close the PuTTy window

https://www.halvorsen.blog

Alternative 2



Virtual Network Computing (VNC)

Hans-Petter Halvorsen

Table of Contents

Alternative 2: VNC

- Virtual Network Computing (VNC) is a Graphical Desktop-sharing System
- RealVNC Server is included with Raspberry Pi OS. It's completely free for non-commercial use; it just needs to be <u>enabled</u>.
- Then you need to install a VNC client on your PC.
- RealVNC is a free VNC Client
 - <u>https://www.realvnc.com/en/connect/download/viewer/</u>

Remote Access using VNC



Enable VNC

Raspberry Pi



VNC Server is already installed, but you need to enable it ("turn it on")

Enabling VNC on Raspberry Pi

Alternative 1: <u>After</u> you have installed the Raspberry Pi OS and starting it up by connection a Monitor, Keyboard and Mouse

	Raspberry Pi Configuration						
	System	Display	Interfaces	Performance	Localisation		
	Camera:		۲	Enable	O Disable		
	SSH:		0	Enable	• Disable		
	VNC:		$^{\circ}$	Enable	• Disable		
	SPI:		۲	Enable	🔘 Disable		
	100			Taabla	Disable		
Menu > Preferences > Raspberry Pi							
Configuration > Interfaces and make							
sure VNC is set to Enable							
	Remote GPIO: O Enable O Disable						
					Cancel	ОК	

Alternative 2: Open a terminal on your Raspberry Pi or use PuTTy

- Enter the command sudo raspi-config
- Use the arrow keys to select Interfacing Options and press Enter
- Use the arrow keys to select VNC and press Enter.
- You will be prompted to enable VNC Server.

VNC Server



RealVNC Server is included with Raspberry Pi OS It is free for non-commercial use. You just need to enable it

VNC Viewer on your PC



https://www.halvorsen.blog

Alternative 3



Hans-Petter Halvorsen

Table of Contents

Alternative 3: RDP

- Remote Desktop Protocol (RDP) is a <u>network protocol</u> developed by Microsoft that allows users to remotely access and interact with the <u>graphical user interface</u> of a remote Windows server
- You need to have an RDP server is installed on the remote server and an RDP client is installed on a local machine. Those are preinstalled on Windows Server and Windows clients (Windows 10/11).
- **XRDP** is a free and open-source implementation of Microsoft RDP (Remote Desktop Protocol) server. This Software can be installed on the Raspberry Pi (which is our "server")

Remote Access using RDP

Your PC





Raspberry Pi



XRDP

https://en.wikipedia.org/wiki/Xrdp

https://www.xrdp.org

XRDP is a free and open-source implementation of Microsoft RDP (Remote Desktop Protocol) server

Install XRDP: sudo apt-get install xrdp

Add New User

- You can no longer use the default account to connect via RDP (for security reasons probably).
- In order to use RDC we need to create a new user on the Raspberry Pi.
- Create New User for RDP connection sudo adduser <username>
 - If user needs sudo rights: sudo adduser <username> sudo
 - If user needs access to GPIO: sudo adduser <username> gpio
 - If user needs access to SPI: sudo adduser <username> spi
 - If user needs access to i2c: sudo adduser <username> i2c
 - etc.

Give All kind of access to the New User

The name of new user you have created

The name of the original/default user created, which may be something else than "pi"

sudo usermod **<username>** -a -G **pi**, adm, dialout, cdrom, sudo, audio, video, plugdev, games, users, input, netdev, spi, i2c, gpio

https://forums.raspberrypi.com/viewtopic.php?t=169079&sid=2dd732a5f43a8ded3bf1f837b36f8c91



https://www.halvorsen.blog

Alternative 4



TeamViewer

Hans-Petter Halvorsen

Table of Contents

Alternative 4: TeamViewer

- TeamViewer is another software for Remote access to the Raspberry Pi and the User interface
- TeamViewer is propriety software (not open source). You can use it for free for noncommercial use
- You need to install TeamViewer software on both the Raspberry Pi and on your PC

Remote Access using TeamViewer

You need to install TeamViewer software both on your PC and your Raspberry Pi



Install TeamViewer on Raspberry Pi

TeamViewer

Products ▼ Resources ▼ Partner ▼ Pricing

Talk to Sales 🗕 🔿

Download the latest version of TeamViewer for Raspberry Pi

By installing and using TeamViewer, you accept our <u>Terms & Conditions</u> and our <u>Privacy Policy</u>.



If trouble, follow this Tutorial: https://pimylifeup.com/raspberry-pi-teamviewer/

Start TeamViewer on Raspberry Pi

Start TeamViewer on your Raspberry Pi:

	pi@raspberrypi: ~ 🗸 🗸 🗸	~ ×	Here vou	u see TeamViewer o	n vour	Raspberrv	Pi:
File Edit Tabs Help i@raspberrypi:~ \$ teamviewer nit		Conne	ection Extras Help R	TeamViewer	,	sert partner ID 😽	v A X
heckCPU: armv7l hecking setup aunching TeamViewer aunching TeamViewer GUI				Free license (non-commercial	use only)		
		0	Sign In Don't have an account?	Allow Remote Control	Cont Partne	trol Remote Cor	nputer
		*	Remote Control	L Password	Inser	rt partner ID	
		2	Computers & Contacts			emote control le transfer	
			Chat			+ Connect	
Open TeamV "teamviewer	iewer by enter " in the Terminal						
		\bigcirc	Team Viewer	Ready to connect (secure connection))		

Install TeamViewer on PC

Install TeamViewer on your PC as well. Then use TeamViewer to connect to your Raspberry Pi:



Hans-Petter Halvorsen

University of South-Eastern Norway

www.usn.no

E-mail: hans.p.halvorsen@usn.no

Web: https://www.halvorsen.blog



