Configuring Remote Operation with NoMachine on Bookworm on Raspberry PI

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Overview

A new version of the Raspberry Pi OS named Bookworm has required some changes in setting up remote operation with streaming audio using NoMachine.

- Windowing system must be changed from Wayland to X11.
- Default audio handler must be changed from the default Pipewire to PulseAudio.
- Pipewire must be completely removed for NoMachine to stream audio.
- write_script.pl, the Perl program used to generate the script to set up audio streaming, has been modified to set the level of USB audio to 50%. The default value is zero which will result in no output power for digital signals going to the radio via USB. This new version is named write_script_bookworm.pl

Details

Run the raspi-config utility:
sudo raspi-config
Go into Option 6, Advanced Options
    Go to A6 Wayland and select X11
    Go to A7 Audio Options and select Pulse
    Not required, but go to Option 2 Display Options, D3 VNC Resolution, and select your preferred resolution for headless operation. I like 1920x1080.
Finish raspi-config and reboot.

You now must remove pipewire and add the pavucontrol volume control program.
    sudo apt purge pipewire
    sudo apt autoremove [removes vestigial Pipewire software]
    sudo apt install pavucontrol.

Install NoMachine.
    Go to http://www.nomachine.com.
    Click on the link for “Other operating systems.”
    Scroll down to “NoMachine Embedded Editions.”
    Click on “NoMachine for Raspberry Pi.
    Scroll down to “NoMachine for Raspberry Pi 4.”
    Select NoMachine for Raspberry ARMv8DEB.

Make sure “arm64” is in the name of the .deb file.
Install the deb file:

sudo dpkg -i nomachine_8.11.3_3_arm64.deb [of course your version number will change over time]

Reboot, will see a small NoMachine icon in your taskbar.
Select “Show server status.”
If you will be operating from away from your home network, you must either enable UPnP or open up ports on your firewall. UPnP is much easier if your router will allow it.
Select “Show server status.”
Select ports, click Configure.
Click checkboxes for “Use UPnP”. Keep Start mode to Automatic. Restart NoMachine or reboot.
Select Status on the NoMachine Service status page. Verify you have an NX service assigned to an external IP address with a port number. Write this info down or better yet take a screen shot. You will use this IP address and port to connect to your system. I suggest using a service like NOIP in case your ISP ever changes your global IP address.
Reboot and make sure you can log in.
Go to Updates page. Uncheck Automatically check for updates. Otherwise whenever an update is issues, the Pi will be waiting for you to click on OK to install update and you won’t be able to log in remotely.

Configure PulseAudio to make your pavucontrol mappings saved between sessions.

sudo nano /etc/pulse/default.pa
change
load-module module-stream-restore restore_device=false
to
load-module module-stream-restore restore_device=true

You may now install your favorite software like Fldigi, Flrig, wsjt-x, and wfview (if you have an Icom radio that supports it).

wsjt-x’s documentation for required libraries is incomplete. The following will download everything required for building wsjt-x from source:

sudo apt-get build-dep wsjtx

Go to http://www.w1hkj.com/W3YJ and download write_script_bookworm.tgz.
Uncompress it:
tar -xzvf write_script_bookworm.tgz
Run the program, identify your radio’s USB cards as inputs and outputs, and save the resulting shell script. I call mine audio_icom.sh.
perl write_script_bookworm.pl

Now, run the script:
sh audio_icom.sh

If all goes well, you will see no error messages and two integers that are process ID numbers.
Go to the upper right hand corner of the NoMachine window, select Audio. Disable and then renable audio.
Be sure your pavucontrol streams are mapped as follows. Adjust sliders for comfortable volume.

- Playback tab
  - Loopback from your USB device to Null Output
- Recording tab
  - Nomachine to Monitor of Null Output

Also make sure your applications are mapped to your radio's USB soundcard