



101 - Install and configure RasPBX

This guide will walk you through setting up the RasPBX, connecting to two virtual softphones, and placing a call between the two phones.

Items needed for this build

- Raspberry Pi (Not all Raspberry Pis are supported. Please check the documentation on the RasPBX Download page.)
- 8GB or larger microSD card
- RasPBX Image - [RasPBX - Asterisk for Raspberry Pi Website](#)
- Image writing software such as balenaEtcher - [balenaEtcher Webpage](#)
- 2 or more devices to run softphone software. These may be iOS, Android, Windows, or Linux devices.

Step 1 - Install RasPBX

1. Go to the [RasPBX \(Asterisk for Raspberry Pi\)](#) site and navigate to the downloads page.

Welcome to RasPBX – Asterisk for Raspberry Pi

This project site maintains a complete install of Asterisk and FreePBX for the famous Raspberry Pi. Check the download page for the latest RasPBX image, which is based on Debian Buster ([Raspbian](#)) and contains Asterisk 16 and FreePBX 15 pre-installed and ready-to-go.

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2. Download the latest RasPBX image file (The latest version is 10-10-2020 as of 9 December 2020.)

RasPBX Images based on Raspbian 10 Buster:

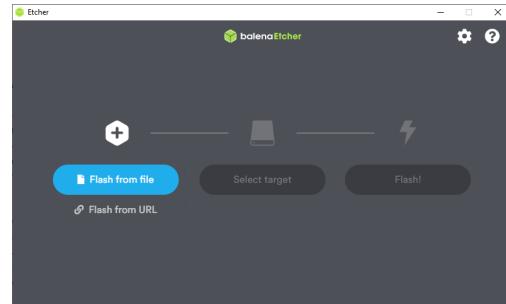
The latest image supports Pi 4, Pi 3 and Pi 2 (Pi 1 and Pi zero no longer supported).

Torrent	raspbx-10-10-2020.zip.torrent
HTTP	raspbx-10-10-2020.zip
SHA-1	b30600cc94989113768f8c5141dc3ee296540
Contents	Asterisk 16.13.0 & FreePBX 15.0.16.75

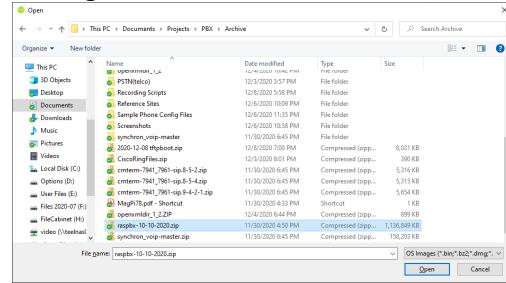
An 8GB card or larger is recommended.

3. Write the image to the microSD card using image writing software such as balenaEtcher. The steps and images below are from balenaEtcher. If you use another imaging software application, the steps may be different but the process is similar.

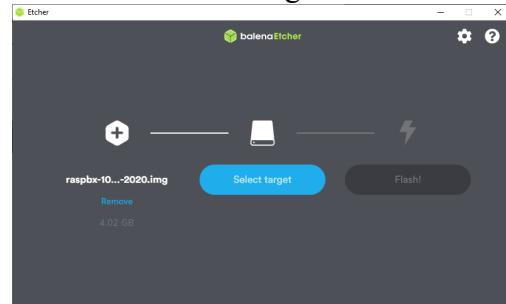
3.1. Click the "Flash from file" button to select the image file



3.2. Select the zip file that you downloaded and click the "Open" button in the Open File Dialog window.

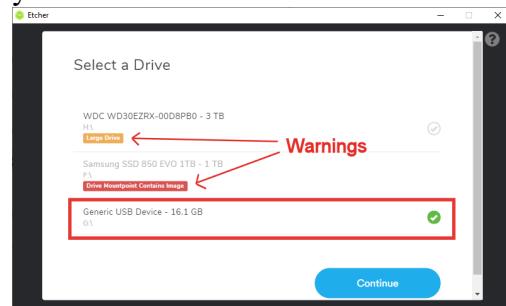


3.3. Click the "Select target" button



3.4. Select the microSD card from the list of devices and click the "Continue" button.

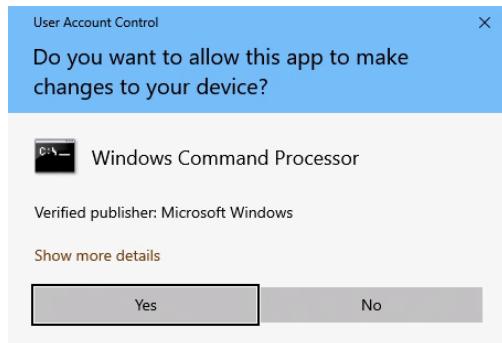
Make certain that you are selecting the correct drive letter. balenaEtcher is nice in that it provides warnings to you if the drive is a large drive, but it is your responsibility to select the correct drive. If you accidentally overwrite another drive, you will not be able to recover the data, so make certain you select the correct drive.



3.5. Click the "Flash!" button to write the image to the microSD card.

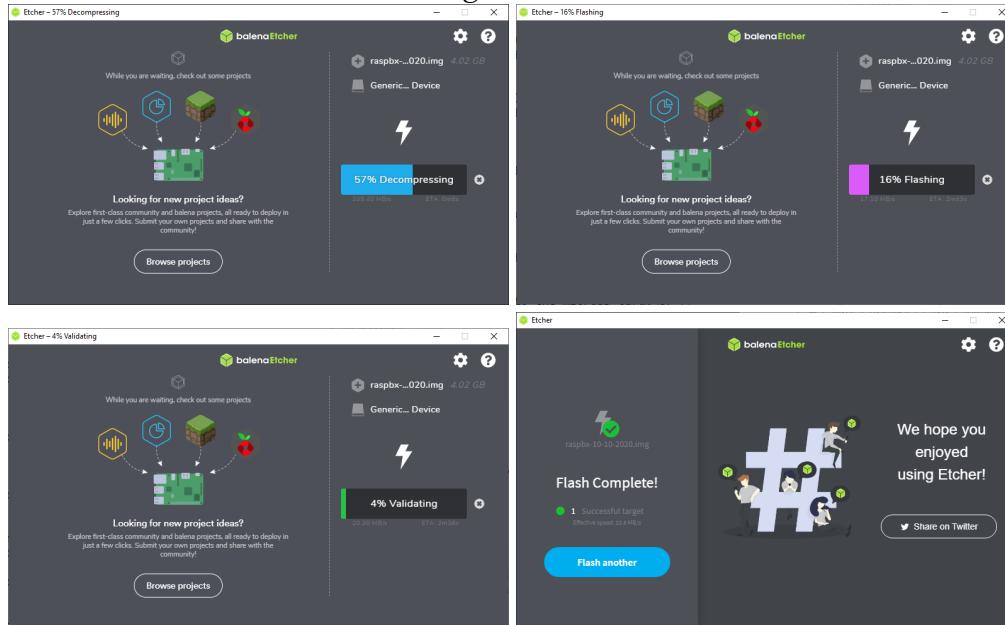


NOTE: If you see a User Account Control (UAC) dialog box, click the "Yes" button to continue.



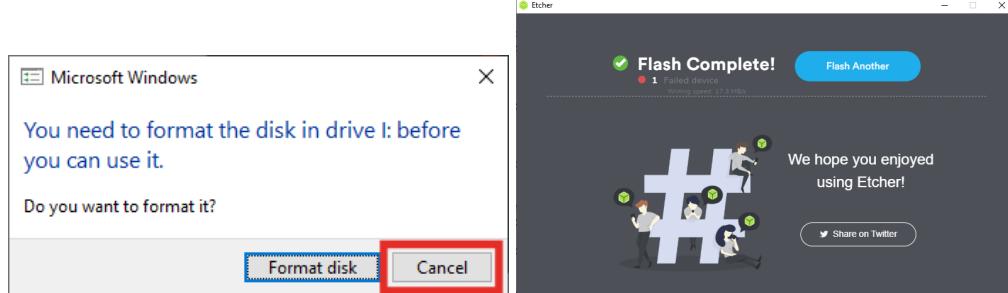
3.6. Wait until the flash process completes. It will take several minutes. You will see the screens shown below.

NOTE: If you are prompted to format the disk at any time, **do not format the disk!** Click the cancel button on the dialog box.



NOTE: Windows may access the drive once the Flashing of the drive is complete. If this happens, you may see a message stating that you need to format the disk. Click Cancel on the dialog. Etcher may then present a message that there is "1 Failed device" on the "Flash Complete" screen. This is due to Windows creating a "System Volume Information" folder on the microSD card during validation. You may safely ignore the error and continue. If you wish to learn more about this message, you may

read [issue #17634](#) on the Tails GitLab project.



4. Insert the microSD card in the Raspberry Pi and power it on.

Step 2 - Setup and configure RasPBX

1. When the Raspberry Pi boots and is prompting for a username and password, login with the default values.

Username: root

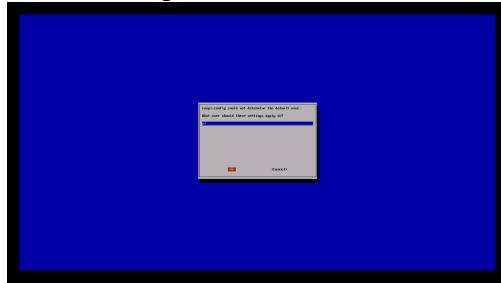
Password: raspberry

2. Launch the Raspberry Pi Configuration application by typing the following at the prompt.

NOTE: Do not type the prompt "root@raspbx:~#". It is displayed for context only.

root@raspbx:~# raspi-config

3. Press tab to place the focus on the "<OK>" button and press Enter.

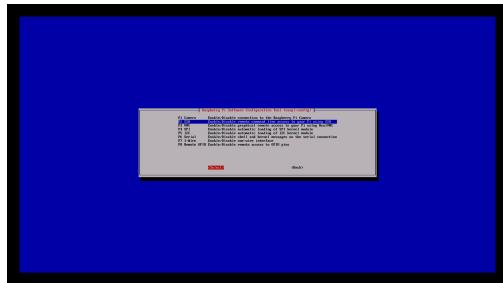


4. (Optional) Enable SSH to allow administration from another PC using applications such as PuTTY and WinSCP.

- 4.1. Scroll down to option "5 Interfacing Options", press tab to place the focus on the "<Select>" button and press Enter.



- 4.2. Scroll down to option "P2 SSH", press tab to place the focus on the "<Select>" button and press Enter.



4.3. Make certain that the focus is on the "<Yes>" button and press Enter.



4.4. Make certain that the focus is on the "<Ok>" button and press Enter.

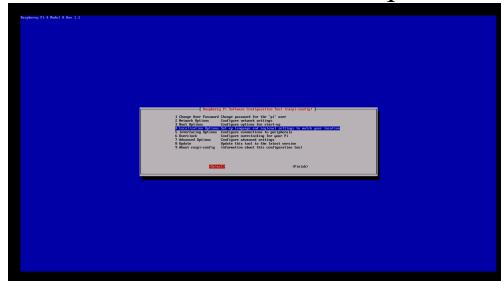


5. (Optional) Change Localization settings

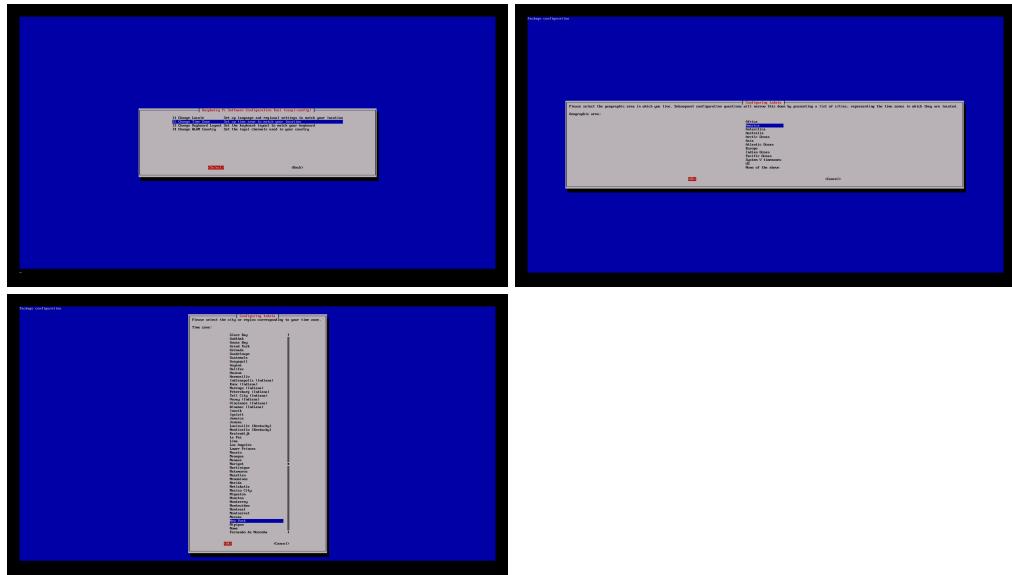
If you are not located in the UK, it is a good idea to change options such as Timezone and Localization.

5.1. Timezone

5.1.1. Scroll down to option "4 Localisation Options", press tab to place the focus on the "<Select>" button and press Enter.



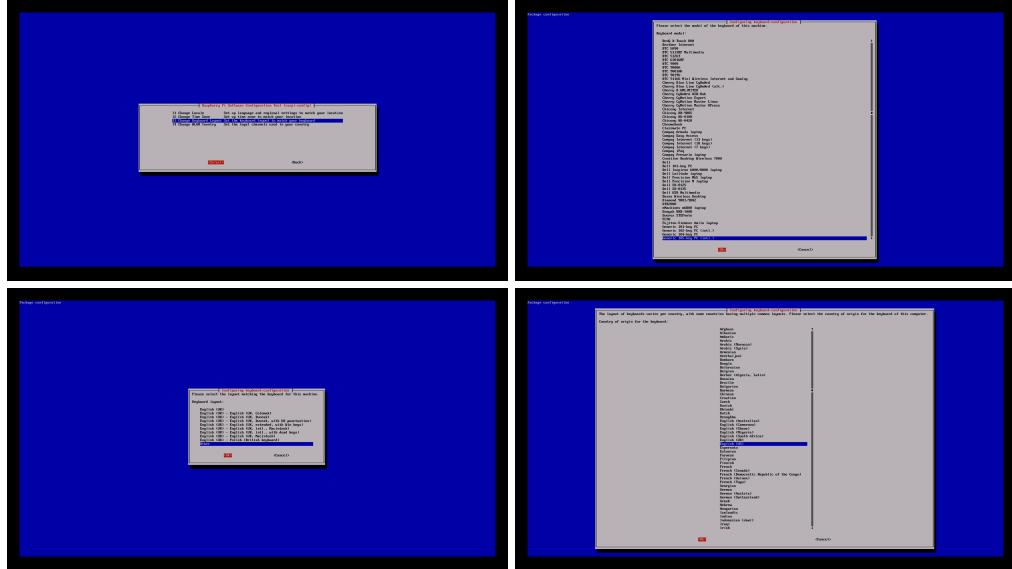
5.1.2. Timezone - Select the "L2 Change Time Zone" option and set the values for your timezone. The screenshots show the options for Eastern Standard Time (EST).

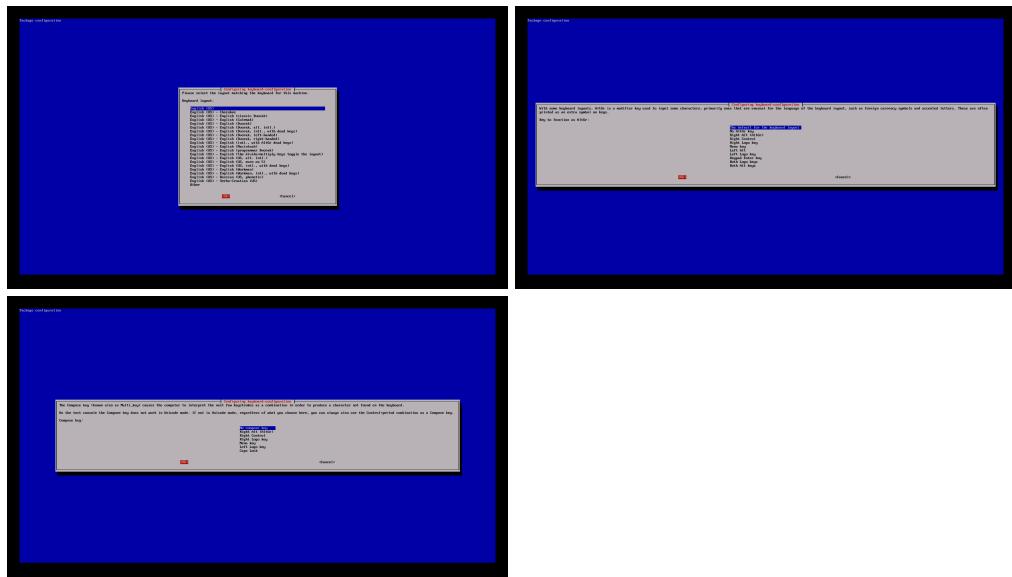


5.1.3. Scroll down to option "4 Localisation Options", press tab to place the focus on the "<Select>" button and press Enter.



5.1.4. Keyboard - Select the "L3 Change Keyboard Layout" option and set the values for your keyboard. The screenshots show the options for US Standard Keyboard.

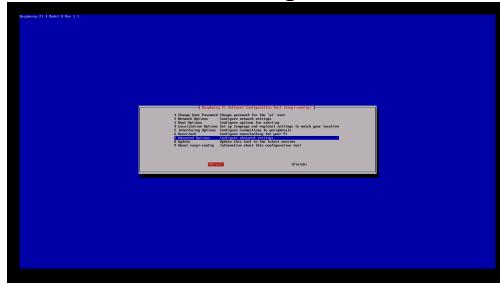




6. (Optional) Expand the File System

If your card is larger than 4GB, then you may want to expand the filesystem to be able to use all the space on the card.

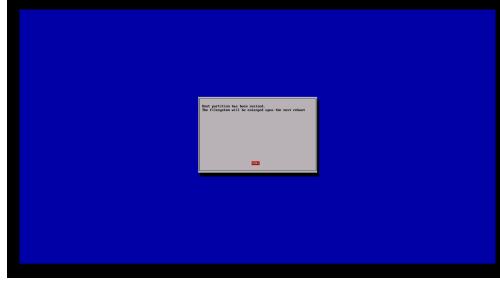
- 6.1. Scroll down to option "6 Advanced Options", press tab to place the focus on the "<Select>" button and press Enter.



- 6.2. Scroll down to option "A1 Expand Filesystem", press tab to place the focus on the "<Select>" button and press Enter.



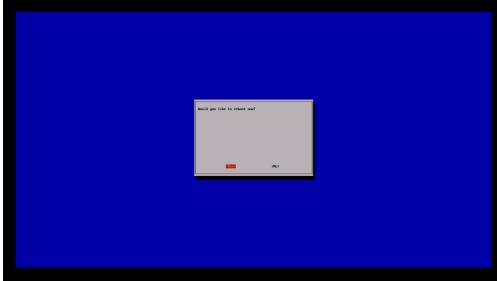
- 6.3. Make certain that the focus is on the "<Ok>" button and press Enter.



7. Tab to the <Finish> button and press the Enter key.



8. Tab to the <Yes> button and press the Enter key to reboot the Raspberry Pi.



After the Raspberry Pi reboots, it is possible to administer the Raspberry Pi on another computer. You may use [PuTTY](#) to run commands and [WinSCP](#) to transfer files between your PC and the Raspberry Pi.

You may be able to connect to the Raspberry Pi using raspbx.local but if that does not work, you will need to find the IP Address for the Raspberry Pi. There are a few ways to find the IP Address. The most straight forward way is to log into the Raspberry Pi and run the command "ifconfig" to obtain the IP Address. Another method is to go to your router or DHCP server and look at the list of leases. Your Raspberry Pi may be listed as "RASPBX". Note the IP Address and use it in PuTTY or WinSCP to connect to the Raspberry Pi.

```
root@raspbx: ~ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.105  netmask 255.255.255.0  broadcast 192.168.1.255
          inet6 fe80::a70b:70ff%eth0  brd fe80::ff:fe00%eth0  scopeid 0x20c1link
            ether dc:a6:32-5b:aa:f6  txqueuelen 1000  (Ethernet)
              RX packets 146  bytes 14979 (14.9 KB)
              RX errors 0  dropped 0  overruns 0  frame 0
              TX packets 73  bytes 9936 (9.7 KB)
              TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
lo: flags=73<POINTCLOCK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
          loop  txqueuelen 1000  (Local Loopback)
            ether 00:00:00:00:00:00  txqueuelen 1000  (Local Loopback)
              RX packets 146  bytes 10403 (10.1 KB)
              RX errors 0  dropped 0  overruns 0  frame 0
              TX packets 146  bytes 10403 (10.1 KB)
              TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
wlan0: flags=4993<UP,BROADCAST,MULTICAST>  mtu 1500
        ether dc:a6:32-5b:aa:f6  txqueuelen 1000  (Ethernet)
          RX packets 0  bytes 0 (0.0 B)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 0  bytes 0 (0.0 B)
          TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
root@raspbx: ~
```

NOTE: It is suggested that you give your Raspberry Pi a static IP Address. There are several ways to assign a static IP Address. You may setup the Raspberry Pi to use a static IP Address or you may create a reservation on your DHCP server.

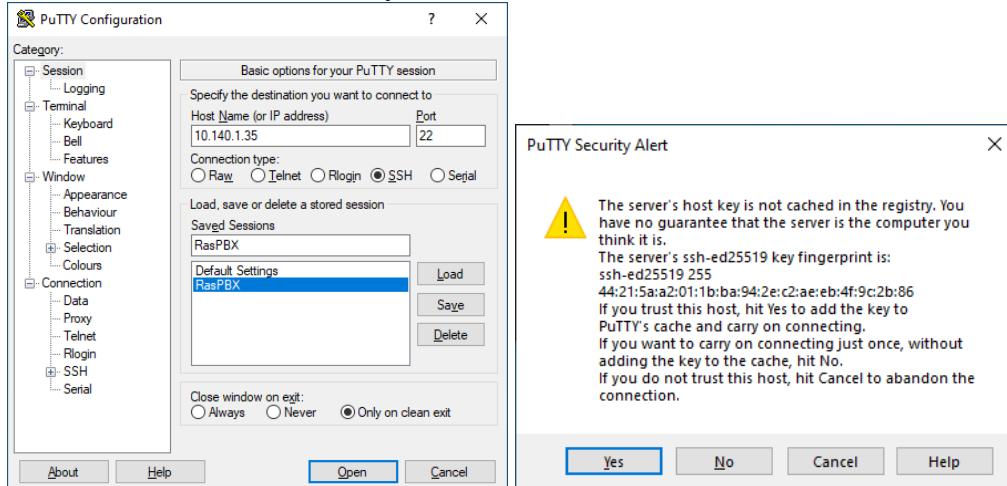
Step 3 - Update RasPBX

This step is optional but highly recommended. The steps here will cover updating the operating system and the FreePBX/Astrisk software.

NOTE: This step requires that you know the IP Address of the RasPBX. If you have not obtained the IP Address, open a terminal window on the RasPBX and run the ifconfig command.

The following steps will be using PuTTY from a Windows machine, which runs commands on the RasPBX remotely using SSH.

1. Connect to the RasPBX with your SSH Client such as PuTTY



2. Log into RasPBX. Below are the default username and password.

Username: root

Password: raspberry

```

10.140.1.35 - PuTTY
login as: root
root@10.140.1.35's password:
Linux raspb 5.4.151-v7l+ #1333 SMP Mon Aug 10 16:51:40 BST 2020 armv7l

Welcome to RasPBX - Asterisk for Raspberry Pi

RasPBX is based on Debian. 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.

RasPBX comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

List of RasPBX specific commands:
-----
raspbx-upgrade      Keep your system up to date with the latest add-ons and
                     security fixes
configure-timezone   Set timezone for both system and PHP
install-fax          Install HylaFAX
add-fax-extension    Add additional fax extension for use with HylaFAX
install-fail2ban     Install Fail2Ban for additional security
install-dongle       Install GSM/3G calling capability with chan_dongle
raspbx-backup        Backup your complete system to an image file

Last login: Tue Dec 22 19:38:59 2020
root@raspbx:~# 
```

3. Run the command "raspbx-upgrade" in the terminal window

```

10.140.1.35 - PuTTY
login as: root
root@10.140.1.35's password:
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install-dongle       Install GSM/3G calling capability with chan_dongle
raspbx-backup        Backup your complete system to an image file

Last login: Tue Dec 22 19:38:59 2020
root@raspbx:~# raspbx-upgrade
```

If prompted for input, select the default value by pressing enter.

```

Building dependency tree...
Reading state information... Done
Calculating upgrade... Done
The following package was automatically installed and is no longer required:
  libgpmi-2.0.0
Use 'apt autoremove' to remove it.
The following NEW packages will be installed:
  libgpmi-3.0.0
The following packages will be upgraded:
  apt apt-utils apache2 apache2-bin apache2-data apache2-mpm-prefork apache2-mod-fcgid
  apache2-mpm-worker apache2-fpm apache2-bin firmware-libertas
  firmware-micronetfree firmware-realtek freetype2-dcc libpcre2-mod-php7.0
  libapt-inst2.0 libapt-pkg5.0 libibutil libcupsys2 libfreerdp2
  libfreerdp2-dev liblqr5 liblqr5-2 liblqr-pegt2-turbo liblqr-crypt0 liblqr5-3
  libkrb5support0 liblapack2.4-0 libldapi-common liblmaria1d3 liblpan-systemd
  liblpuice0 libraspberrypi-bin libraspberrypi-dev libraspberrypi1-doc
  libraspberrypi1 libraspberrypi1-dev libraspberrypi1-doc libsystemd libudev mariadb-client
  mariadb-client-3.9 mariadb-client-core mariadb-common mariadb-server
  mariadb-server-10.3 mariadb-server-10.3 mariadb-server-10.3-common mariadb10.3-common php7.0
  php7.0-clients php7.0-common php7.0-curl php7.0-intl php7.0-javascript php7.0-mbstring
  php7.0-mysql php7.0-opcache php7.0-readline php7.0-xml python3-aptpython3
  python3-apt raspberrypi-bootloader raspberrypi-kernel raspberrypi-sys-mods
  raspi-configny rpi-eeprom sqlite3 systemd systemd-gsys tzdata udev
70 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 170 MB of archives. After unpacking, 565 KB of additional disk space will be used.
Do you want to continue? [Y/n] 
```

Step 4 - Initial RasPBX Setup

1. Open a web browser and navigate to <http://raspbx.local/> or use the IP Address or your Raspberry Pi.
2. The Initial Setup Screen is shown. Complete the requested information and click the "Setup System" button.

The screenshot shows the 'Initial Setup' page of the FreePBX Administration interface. It prompts the user to provide core settings for administering and updating the system. The fields include:

- Administrator User:** Username (Admin user name), Password (Admin password), Confirm Password (Admin password).
- System Notifications Email:** Email Address.
- System Identifier:** VoIP Server.
- Automatic Module Updates:** Enabled, Email Only, Disabled.
- Automatic Module Security Updates:** Enabled, Email Only.
- Send Security Emails For Unsigned Modules:** Enabled, Disabled.
- Check for updates every:** Saturday, Between 2am and 8am.

A red box highlights the 'Setup System' button at the bottom right of the form.

3. Click on the "FreePBX Administration" button

The screenshot shows the main navigation menu of the FreePBX Administration interface. It features three main buttons:

- FreePBX Administration** (highlighted with a red circle)
- User Control Panel**
- Get Support**

A red box highlights the 'FreePBX Administration' button.

4. Enter the username and password that you created on the Initial Setup Screen to log into FreePBX.

The screenshot shows the 'Login' screen of the FreePBX Administration interface. It displays a 'Login' form with the following fields:

- To get started, please enter your credentials:
- username (text input field)
- password (text input field)
- Buttons: Continue, Cancel.

The background features icons for FreePBX Administration, User Control Panel, and Get Support.

5. Change the localization settings if necessary and click the "Submit" button

Please Select the default locales of the PBX
Based on your locale your language and timezone have been pre-selected.

Sound Prompts Language: English

System Language: English (United States)

Timezone: America/New_York

Submit

6. Click the "Admin" menu item and select "Updates" from the drop-down

Welcome to FreePBX

FreePBX 15.0.16.75 VoIP Server

You can change this name in Advanced Settings

Summary

System Alerts

No critical issues found

Asterisk MySQL Web Server Mail Queue

Collecting anonymous Browser stats

Missing HTML5 format converters

3 New modules are available

Default bind port for CHAN_PJSIP is 5060, CHAN_SIP is 5160

FreePBX – Let Freedom Ring Feed

- Introducing FreePBX Feature Catalog
- Powerful Call Flow using the Dynamic Routes Module
- Powerful Call Flow using the Dynamic Routes Module
- OctoFax: Fax On The Fly Asterisk
- Introducing Sangoma Mobile App: Sangoma Connect
- FreePBX 15.0.16.75

Sangoma Feed

- The Best of the Month: Minute 2020 Edition
- The Amazing Benefits of Virtualization Services in a Work-from-home Reality
- System Integration and Security will be important for the Future of UC
- System Integration and Security will be important for the Future of UC
- OctoFax: Fax On The Fly Asterisk
- Introducing Sangoma Mobile App: Sangoma Connect
- FreePBX 15.0.16.75

FreePBX Statistics

Asterisk

7. Click the "Module Updates" tab

Summary

Scheduler and Alerts

Module Updates

System Updates

Current PBX version: 15.0.16.75

Current System Version: Unknown

Total Module Count: 26

Enabled: 26

The numbers below may be inaccurate if no modules have been released since the last check:

Last online check: 2020-10-05T19:03:44+0000

Modules with Upgrades: 0

System Updates Available: Integrated System Updates available on this platform

8. Click the "Check Online" button

Reports

Check Online

Standard Extended

Reset Process

Admin

Module	Version	Track	Publisher	License	Status
> Backup & Restore	15.0.10.38	Stable	Sangoma Technology	GPLv3+	Enabled
> Custom Applications	15.0.10.38	Stable	Sangoma Technology	AGPLv3+	Enabled
> Feature Control Admin	15.0.5.5	Stable	Sangoma Technology	AGPLv3+	Enabled
> FreePBX Framework	15.0.16.75	Stable	Sangoma Technology	GPLv3+	Enabled
> Process Management	15.0.3.8	Stable	Sangoma Technology	AGPLv3+	Enabled
> Metrics	15.0.8.3	Stable	Sangoma Technology	AGPLv3+	Enabled
> Sound Languages	15.0.5.9	Stable	Sangoma Technology	GPLv3+	Enabled

Applications

Module	Version	Track	Publisher	License	Status
> Announcements	15.0.3.11	Stable	Sangoma Technology	GPLv3+	Enabled
> Cell Recording	15.0.7.7	Stable	Sangoma Technology	AGPLv3+	Enabled
> Conference	15.0.7.5	Stable	Sangoma Technology	AGPLv3+	Enabled
> Core	15.0.12.29	Stable	Sangoma Technology	GPLv3+	Enabled
> IVR	15.0.28	Stable	Sangoma Technology	GPLv3+	Enabled
> Jitsi Services	14.0.3	Stable	Sangoma Technology	AGPLv3+	Enabled
> Queues	15.0.23	Stable	Sangoma Technology	GPLv3+	Enabled
> Ring Groups	15.0.11.9	Stable	Sangoma Technology	GPLv3+	Enabled

Dashboard

Module	Version	Track	Publisher	License	Status
> System Dashboard	15.0.7	Stable	Sangoma Technology	AGPLv3+	Enabled

Reports

Module	Version	Track	Publisher	License	Status
> Asterisk Info	15.0.11	Stable	Sangoma Technology	GPLv3+	Enabled

9. Click the "Upgrade all" button

The screenshot shows the 'Module Updates' tab of the RasPBX Admin interface. At the top right, there are several buttons: 'Download all', 'Upgrade all' (which is highlighted with a red box), 'Reset', and 'Process'. Below these buttons, there are tabs for 'Summary', 'Scheduler and Alerts', 'Module Updates', and 'System Updates'. Under the 'Module Updates' tab, there are two sections: 'Admin' and 'Applications'. The 'Admin' section lists various modules with their versions, tracks, publishers, and statuses. The 'Applications' section lists a single module, 'Announcements', with version 1.0.0. It shows that it is not installed and available online.

10. Click the "Process" button

This screenshot is similar to the previous one, showing the 'Module Updates' tab. The 'Process' button at the top right is highlighted with a red box. The 'Admin' section shows the 'Backup & Restore' module is upgradable to version 15.0.10.38. The 'Applications' section shows the 'Announcements' module is not installed and available online.

11. Click the "Confirm" button

A confirmation dialog box is displayed, asking for confirmation to upgrade the following modules: Asterisk Info 15.0.11, Backup & Restore 15.0.10.38, Call Recording 15.0.7.12, CSV Reports 15.0.7.13, Conferences 15.0.7.14, Conference 15.0.7.15, Feature Code Admin 15.0.6.5, FreePBX Framework 15.0.6.75, Asterisk SIP Settings 15.0.6.29, and Voicemail 15.0.10.16. The 'Confirm' button is highlighted with a red box.

A status dialog box is shown, indicating the process of upgrading modules. It lists several tasks: 'Checking if field cdr_id is present in cdr table...OK', 'Checking if field cdr is present in cdr table...OK', 'Checking if field peerid is present in cdr table...OK', 'Checking if field sequence is present in cdr table...OK', and 'cdr installed successfully'. The 'Confirm' and 'Cancel' buttons are visible at the bottom.

12. Click the "Return" button

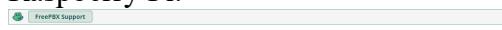
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13. Click the red "Apply Config" button in the upper right

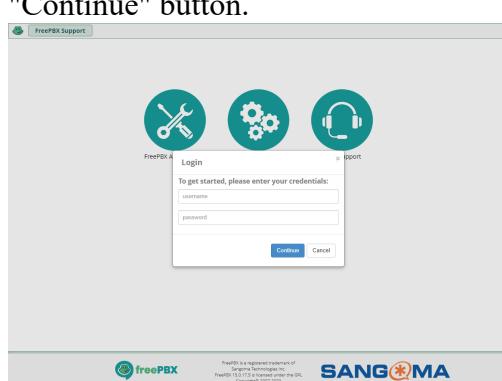
The screenshot shows the RasPBX Admin interface with the 'Module Updates' tab selected. At the top right, there is a red rectangular box highlighting the 'Apply Config' button. Below it, the interface displays various module lists under Admin, Applications, and Dashboard sections, each with columns for Module, Version, Track, Publisher, License, and Status.

Step 5 - Add extensions to RasPBX for the softphones

1. Open a web browser and navigate to <http://raspbx.local/> or use the IP Address or your Raspberry Pi.



2. Enter the username and password you created during the intial RasPBX setup and click the "Continue" button.



3. Click on the "Applications" button and select the "Extensions" option from the drop-down menu.

4. Click the "+Add Extension" button and select "Add New SIP [chan_pjsip] Extension" from the drop-down menu.

NOTE: Other extension types may work but PJSIP is what I used here. Feel free to try others if you like.

5. Enter values in the following fields and click the "Submit" button.

- o User Extension
- o Display Name
- o Outbound CID

NOTES:

- o Place your mouse over the "?" icons next to each field to see a description of what to enter in the field.
- o Click into the "Secret" field and copy the value as we will need it to setup the softphone.

6. Click on the "Voicemail" tab to turn on voicemail for the extention.

7. Click on the "Yes" button for the "Enabled" option to enable voicemail. Enter a Voicemail Password. The default is to enter the extension number. The user will need to change the password when setting up voicemail if the password is the same as the extension. Once voicemail is enabled and the "Voicemail Password" are set, click the "Submit" button.

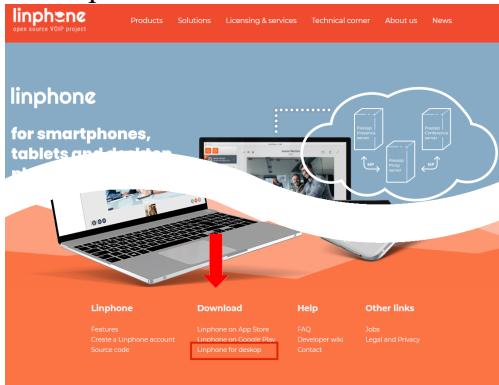
8. Repeat the above steps to add an extension for another softphone then click the "Apply Config" button.

Step 6 - Install & provision softphones

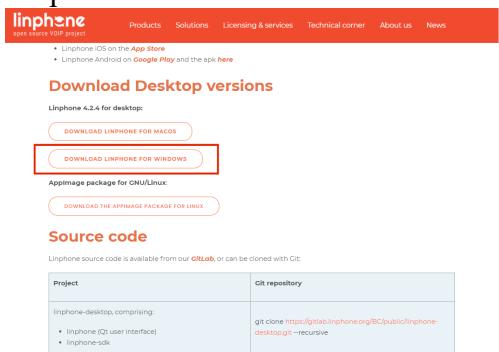
This example will show installing [Linphone](#) softphones on Windows and Android. It is possible to install the softphones on Linux and iOS as well. There are other softphone software available such as [Zoiper](#). It is not necessary to use the same operating systems or software.

Linphone on Windows

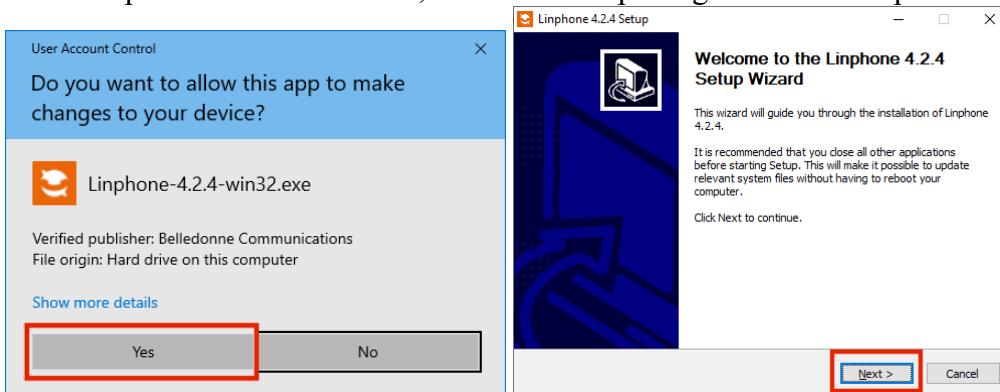
1. Go to the [Linphone Website](#). Go to the bottom of the page and click on the "Linphone for desktop" under the "Download" heading.

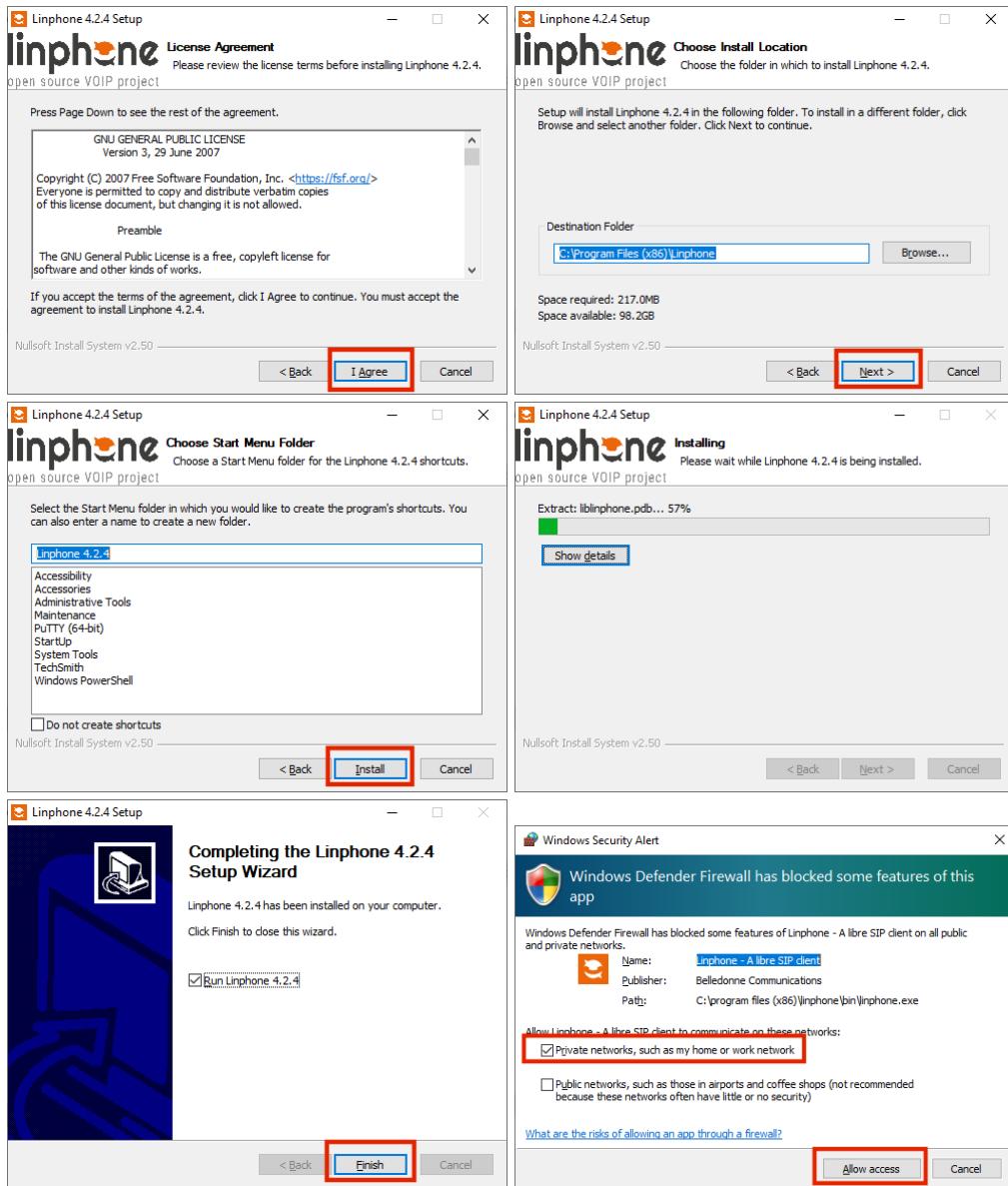


2. Scroll down the page to the "Download Desktop versions" section and click the "Download Linphone for Windows" button.

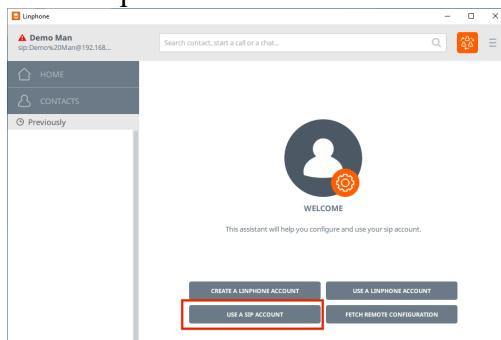


3. Once Linphone has downloaded, run the install package to install Linphone.



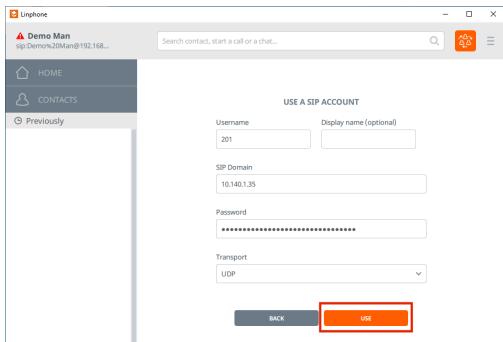


4. Start Linphone and click the "Use a SIP Account" button

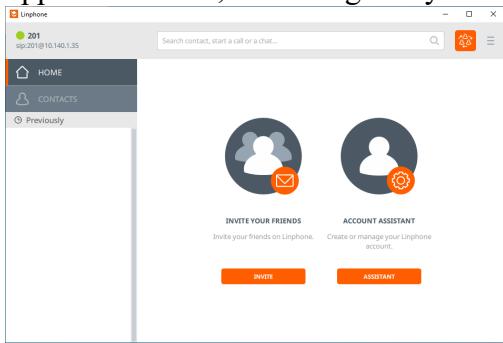


5. Enter the following information and click the "Use" button

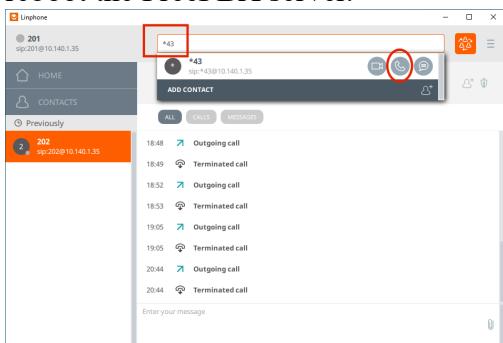
- o Username: This will be the extension that was setup in FreePBX
- o SIP Domain: Enter the IP Address of the RasPBX
- o Password: Enter the "Secret" value from when the extension was setup
- o Transport: Select "UDP"



After clicking the "Use" button, you will see the home screen with a green status in the upper left corner, indicating that you are connected to the FreePBX server.

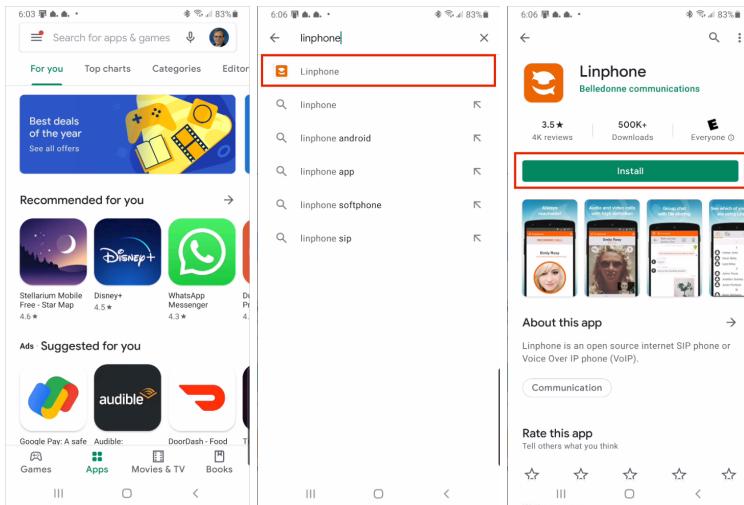


6. You may dial *43 to perform an echo test. If you do not hear yourself when you talk, reboot the Raspberry Pi and try again. When changing SIP settings it is sometimes necessary to reboot the FreePBX server.

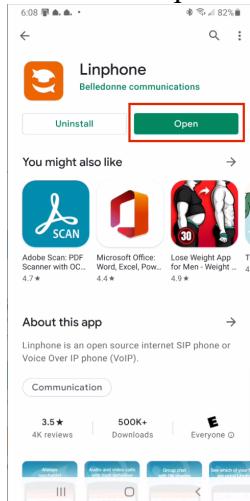


Linphone on Android

1. Open the Android "Play Store" application and search for "Linphone". Select "Linphone" from the results and click the "Install" button.



2. Once the Linphone application installs, click the "Open" button to open the application.

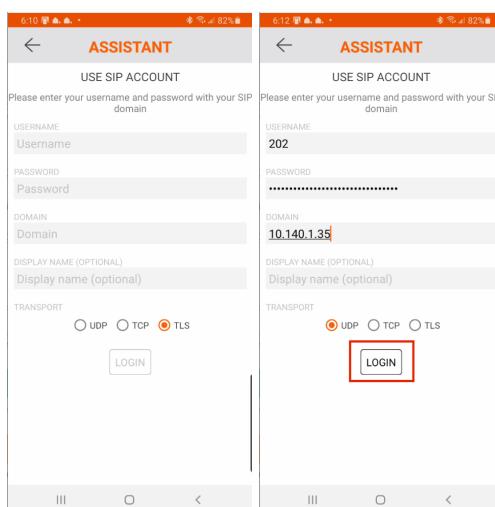


3. Click the "Use SIP Account" button on the "Welcome" screen of the Linphone application.

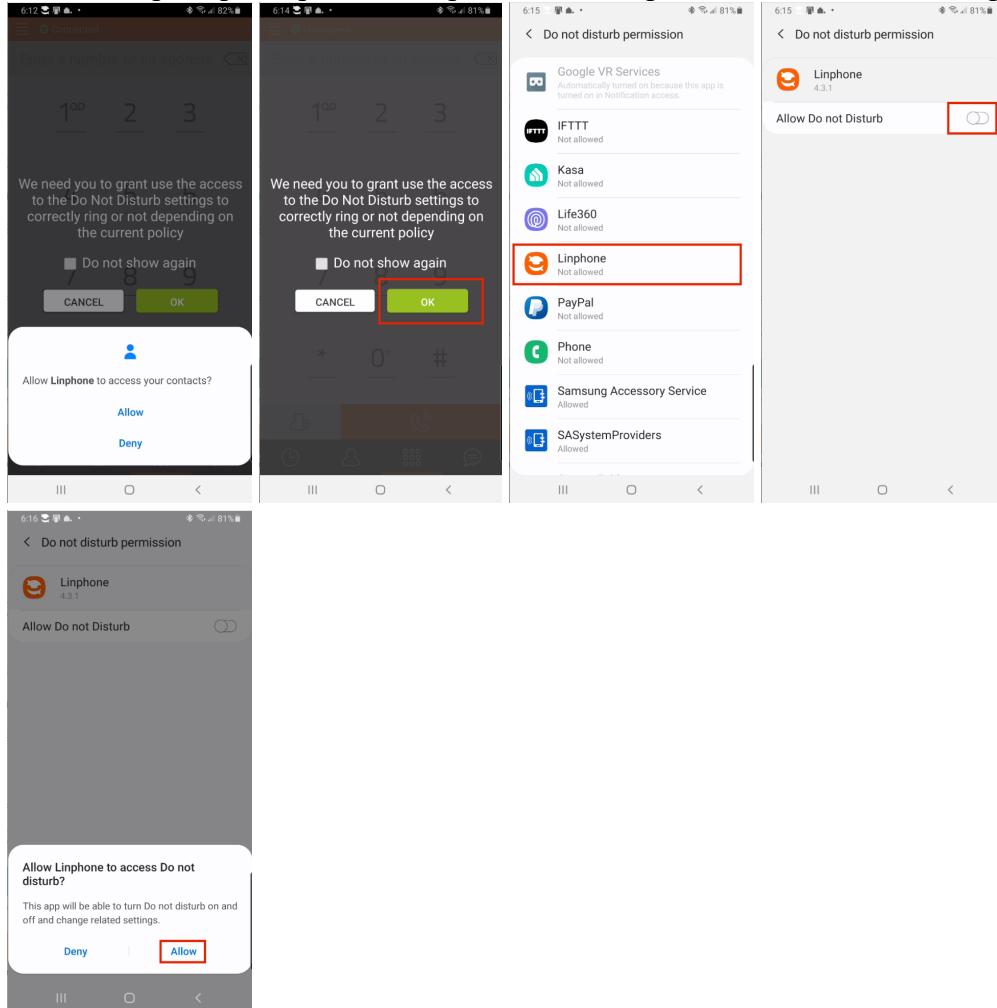


4. Enter the following information in the SIP account screen and click the "Login" button.

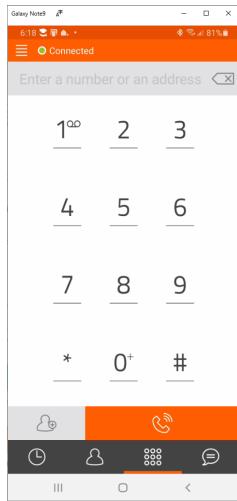
- Username: This will be the extension that was setup in FreePBX
- Password: Enter the "Secret" value from when the extension was setup
- Domain: Enter the IP Address of the RasPBX
- Transport: Select "UDP"



5. Follow the prompts to provide Linphone with the permissions needed to run properly.

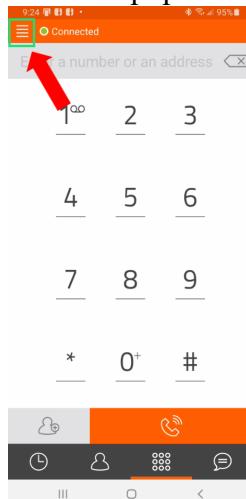


6. Return to the Linphone application and note that the upper left corner show a green "Connected" status, indicating that it is connected to the FreePBX server.

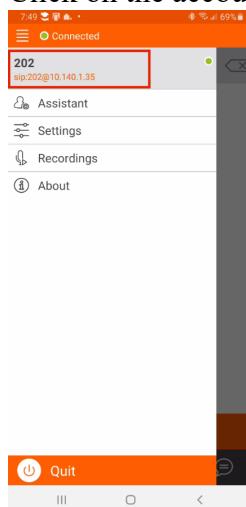


7. Now we must fix an issue with Linphone. Linphone prepends the country code to every call so we need to configure it not to add the country code. Click the menu in the upper left

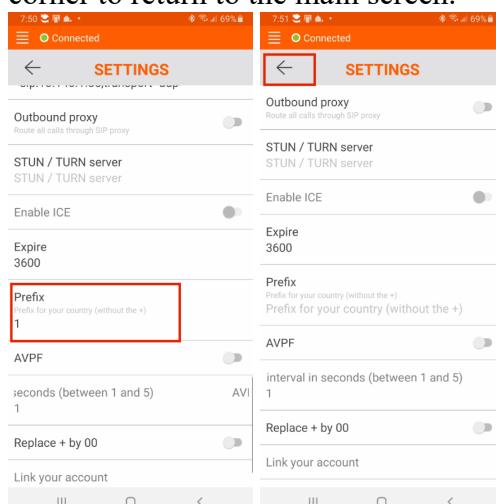
corner to pop out the menu items.



8. Click on the account at the top of the menu.



9. Locate "Prefix" in the options, remove the value, then click the arrow in the upper left corner to return to the main screen.



NOTE: If you do not remove the "Prefix" value you will see an error notification when

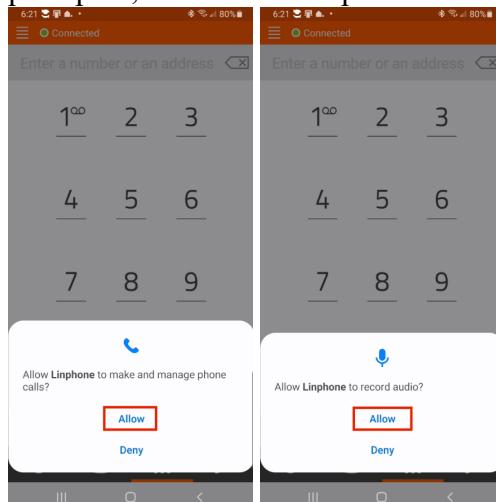
attempting to call other extensions stating, "User not found".



10. You may dial *43 to perform an echo test. If you do not hear yourself when you talk, reboot the Raspberry Pi and try again. When changing SIP settings it is sometimes necessary to reboot the FreePBX server.

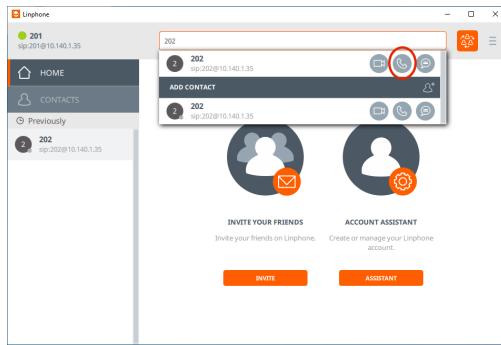


When placing your first call, Linphone will ask for additional permissions. When prompted, select "Allow" permissions.



Place a test call

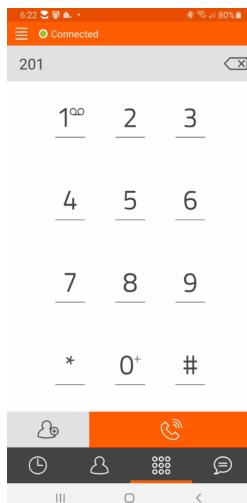
1. From the Windows Linphone application, place a call to the Android application by typing the extension and clicking the phone icon that appears below the text box.



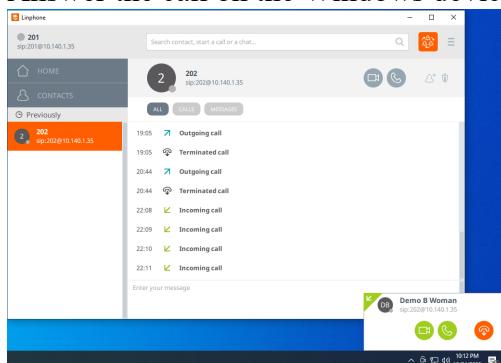
Answer the call on the Android device.



2. From the Android Linphone application, place a call to the Windows application.



Answer the call on the Windows device.



[Return to RasPBX Build](#)

