



Crux LX User Manual v1.0 GR5

User reference guide
detailing how-to use
and configure Crux LX
for various functions

Crux Labs

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Version History

Release Date	Document Title	Document Version	Crux LX Version	Author	E-mail
July 2017	Crux LX Quick Start Guide	v1.0 GR1	v1.0 GR1	Rohit Gupta	info@crux-labs.com
Feb 2018	Crux LX User Manual	v1.0 GR3	v1.0 GR3	Rohit Gupta	info@crux-labs.com
May 2018	Crux LX User Manual	v1.0 GR4	v1.0 GR4	Rohit Gupta	info@crux-labs.com
July 2018	Crux LX User Manual	v1.1 GR4	v1.0 GR4	Rohit Gupta	info@crux-labs.com
October 2018	Crux LX User Manual	v1.0 GR5	v1.0 GR5	Rohit Gupta	info@crux-labs.com
February 2019	Crux LX User Manual	v1.0 GR5	v1.0 GR5	Rohit Gupta	info@crux-labs.com

1. What's in the box?



1x **Crux LX Smart Router**
1x **5V 2.5A Power Adapter**
3x **Multi-region plugs**
1x **Ethernet Cable** (in v1.0 GR3)
(Optional) 1x **GSM HSPA USB Stick**



When to order **GSM Dongle with Crux LX?**

1. When you wish to share one GSM SIM between multiple-users, when travelling or when using GSM SIM as a trunk line.
2. You can use data and voice simultaneously. It is possible to turn off data when not needed, and use only voice.
3. When someone from outside calls the SIM number in the Dongle, Crux LX can be pre-configured to ring in parallel on connected user phones. The default Ring Group is 401, which corresponds to extensions 200 to 205. Whoever picks up the call first gets connected.
4. To make an outgoing call using the Dongle, just pre-pend the number with a 0 when dialling from any phone using the Linphone app.

2. What is Crux LX?

Crux LX is a **wireless router** and access point that **allows users to make VoIP calls** to each other and gives access to a **long list of features** that typically large companies get from a **high-end IP-PBX** solution.



In short, it is an all-in-one router that **eliminates** the need for **wired or cordless telephone instruments, wires, answering machines and intercoms**, integrating all functionality into just one device, that can connect up to 250 users.

It **declutters the sprawl** and ensures **seamless continuity** beyond boundaries. Yes, you can **receive calls that are ringing in your home or office, even when you are not physically there, paying zero call forwarding charges.**

3. Quick Start

HOW DOES IT WORK?



STEP 1 - Setup Crux LX as Router

1. Power ON Crux LX
2. Connect it to modem by wire
3. Connect your smart phone
SSID: CRUX-LX-WiFi-SSID Password: cruxwifi

STEP2 - Setup TWO Mobiles to try a VoIP call

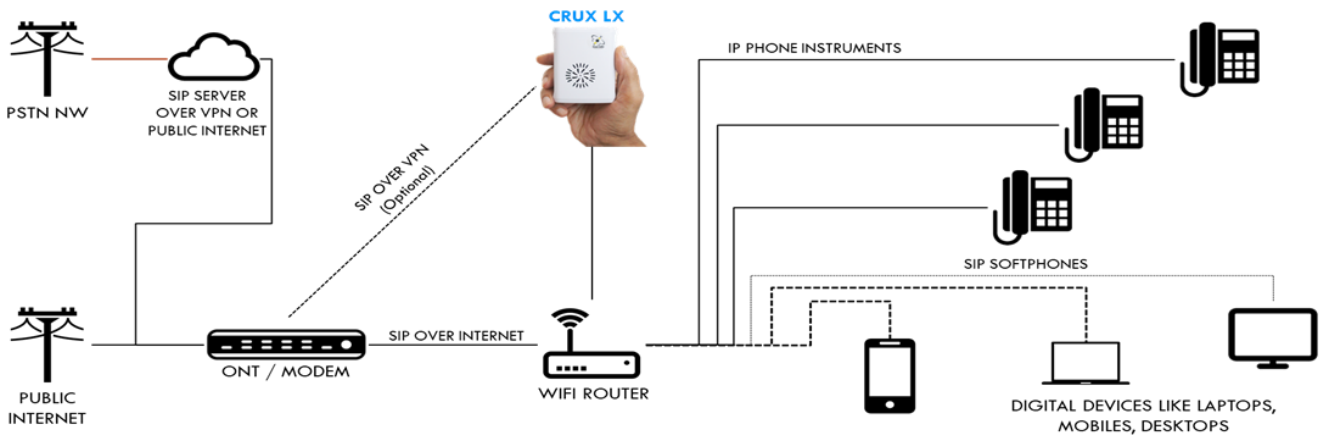
1. Download "**Zoiper**" or "**Linphone**" app on both phones
2. Select "Use SIP Account" and Login with following
Username: 200 or 201
(Phone1: 200, Phone2: 201)
Default Password: crux1234
Domain: 192.168.45.1
Transport: UDP
3. After Login, confirm status as "**Registered**" on top

STEP 3 - And Go!

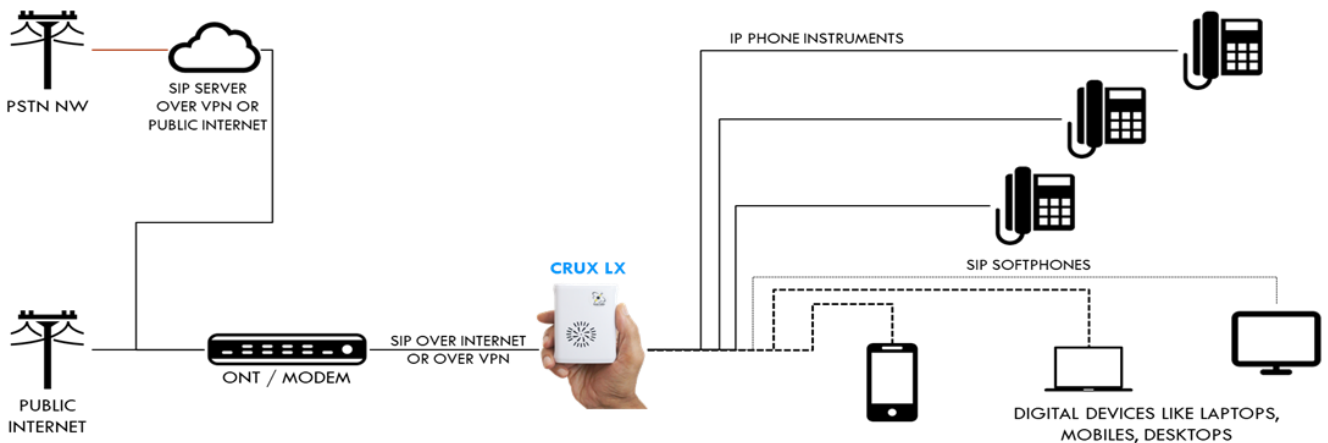
1. Now **dial 201 on Phone1** using "Linphone" app

4. Deployment Scenarios

Mid-sized Offices – Already having LAN and Wireless Infrastructure



Small Offices – No pre-existing LAN or Wireless Infrastructure (Crux LX as Router)



Important note on security

IMPORTANT

Remember to change all default passwords in Crux before you start configuring it for use. It is critical to change following passwords:

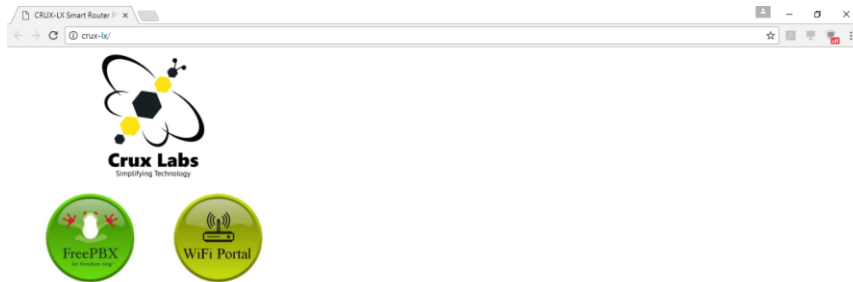
- FreePBX admin user
- WiFi Portal admin user
- Passwords for default extensions 200 to 299

Always use a strong password for all the above users

5. Accessing Crux LX Admin portals

- If connected to Crux LX WiFi SSID - point your browser to <http://192.168.45.1> or <http://crux-lx/>
- If connected to Crux LX via some other network, then point to the IP address assigned to Crux LX.

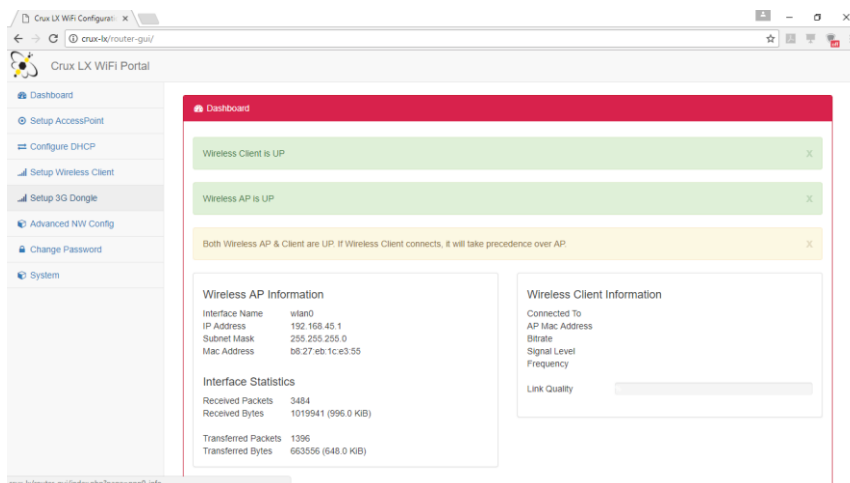
NOTE – For Remote Access to Crux LX Admin Portals, you can access Crux LX Admin portals remotely via WAN IP address or DDNS as <http://<WAN-IP>/> or <http://<DDNS>/> (if Crux LX is connected directly to internet). If Crux LX is behind a firewall or another Router that implements a firewall, then you will need to add a Port Forwarding rule to forward external port 10080 and 10022 to internal port 80 and 22 respectively of Crux LX's LAN IP address. Then remotely access as <http://<WAN-IP>:10080/> or <http://<DDNS>:10080/>.



- Click FreePBX for managing the IP-PBX components like setting up IVR, Trunk lines, Extensions, User management, CDR, Call Recordings etc. (Default login/password: admin/admin)



- Click WiFi Portal for managing the Router, AP, Network settings and 3G Dongle data options. (Default login/password: admin/admin)

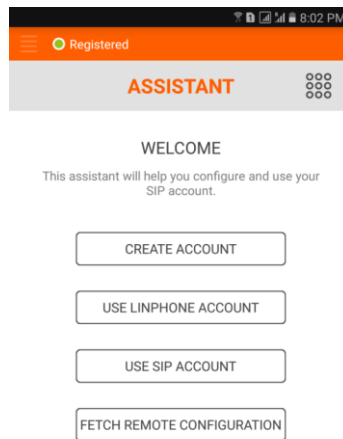


6. Crux LX Guide to Voice (FreePBX) functions

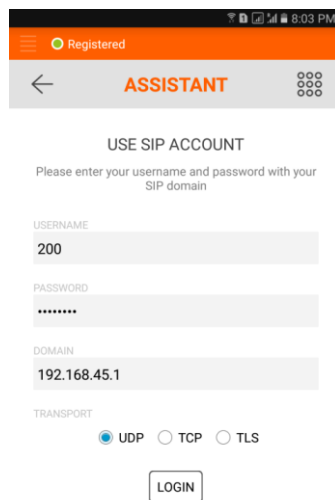
How to start using the pre-configured Intercom

Steps to be followed on the mobile phone or laptop

- a) Download Zoiper or Linphone app on your mobile.
- b) Connect to Crux LX WiFi SSID
- c) Start the Linphone app and select Assistant if Assistant does not open up by default



- d) Select "USE SIP ACCOUNT"



- e) USERNAME:
NOTE – Crux LX comes pre-configured with 100 extensions, 200 to 299. Extensions are unique. 1 extension can be used by only 1 person/device. Contact the administrator to receive your extension and password.
- f) PASSWORD: crux1234 (default is "crux1234")
- g) DOMAIN: 192.168.45.1 (default is "192.168.45.1")
- h) TRANSPORT: UDP
- i) Click Login
- j) The phone should now indicate a green-dot alongside "Registered" on the top of the app screen.

NOTE – Common issue people face. Even after pressing Login, if the "Registered" sign does not come up, despite correct credentials entered, check if the phone is connected to CruxLX-WiFi-SSID or on the same network being referenced. The IP address provided in Domain field must be reachable.

How to make and receive external calls (Adding GSM or SIP Trunk lines)

By now, you may have configured a few handsets or devices to make internal calls using Crux LX. For being able to call phone and mobile numbers from Crux LX, you need to add Trunk lines in the form of a digital SIP trunk or a GSM trunk. Following sections describe how it is to be done. Before proceeding, you will need to subscribe to a SIP trunk line from a telecom provider or procure a 3G compliant SIM card from any vendor. Remember, there is more help available in form of videos and documents at <http://youtube.crux-labs.com> and <http://www.freepbx.org>.

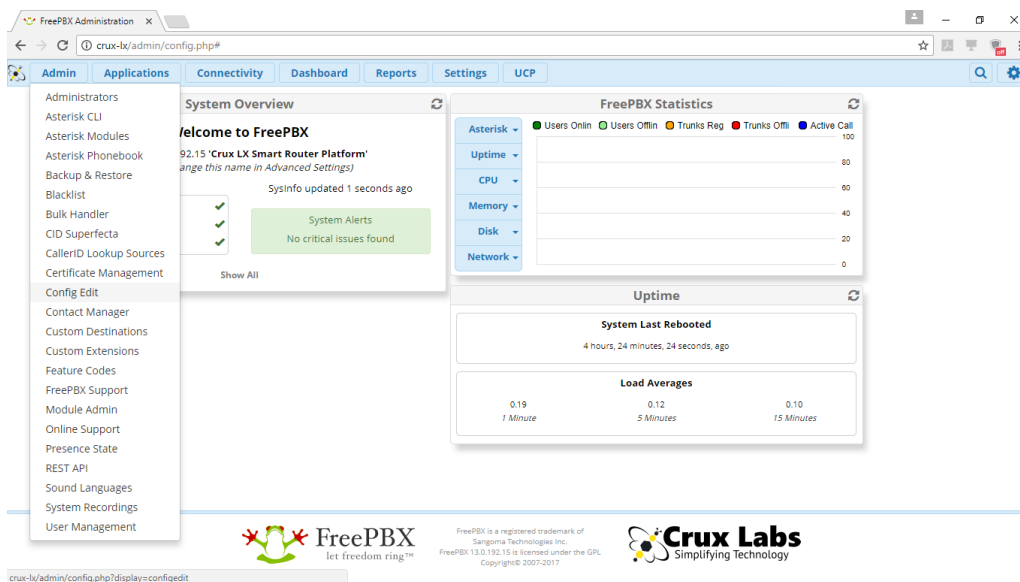
How to add a GSM or SIP Trunk Line

Additional steps for setting up a GSM Trunk Line

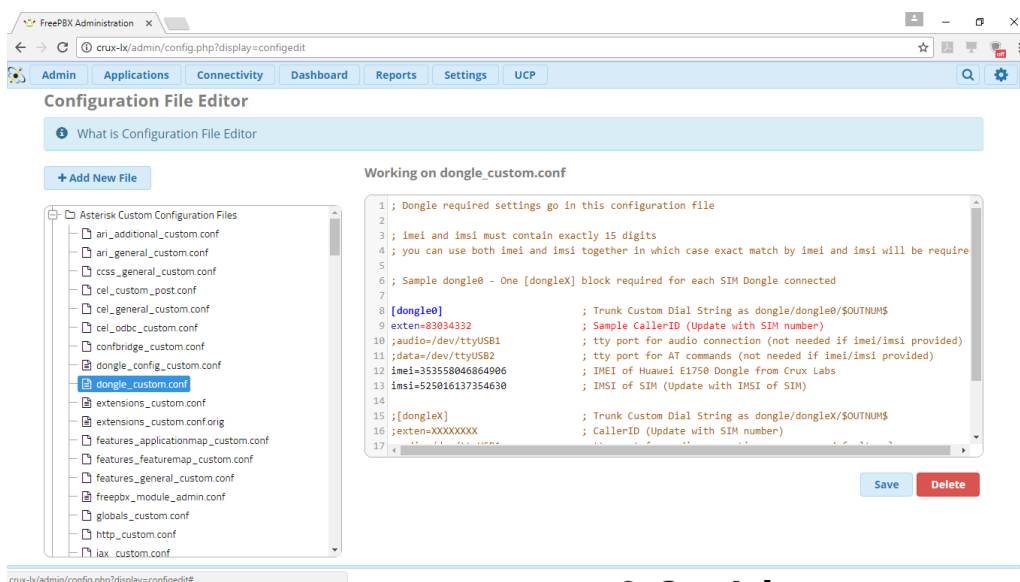
When setting up a GSM Trunk line, a few additional steps need to be followed, prior to adding the GSM Trunk. This is to ensure that the GSM dongle and SIM are authenticated for use.

Updating Dongle and SIM credentials

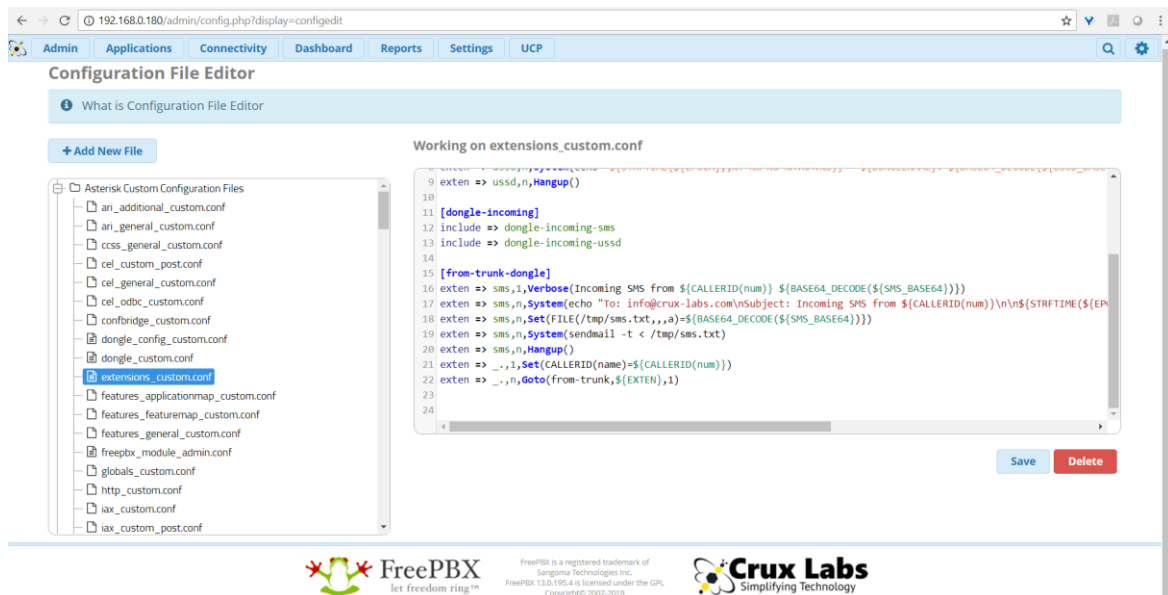
- Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- Select in the menu, Admin -> Config Edit



- Select file dongle_custom.conf



- d) Copy the block starting [dongleX] till “imsi=” and paste it, changing [dongleX] to dongle[0] if this is the first dongle being installed, else number it according to the number of dongle being installed.
- e) In the new [dongle0] block, uncomment lines stating “exten”, “imei” and “imsi” by removing the “;” symbol in the beginning of the line
- f) Carefully update the line that reads “exten=” with the mobile number, without country codes.
- g) Carefully update the IMEI number that is printed on each Dongle. IMEI # uniquely identifies each Dongle globally.
- h) Carefully update the IMSI number that is unique to each SIM card. IMSI # uniquely identifies each SIM card globally.
- i) After updating the aforementioned configuration data, click Save.
- j) “Apply Config” button will appear on top right corner. Click the “Apply Config” button to ensure FreePBX/Asterisk picks up the changes and incorporates it into its configuration.
- k) Select Submit, followed by Apply Config.
- l) Select file extensions_custom.conf
- m) Goto context [from-trunk-dongle]
- n) Update email id to receive SMS that are received on the dongle, to be forwarded to your email id.



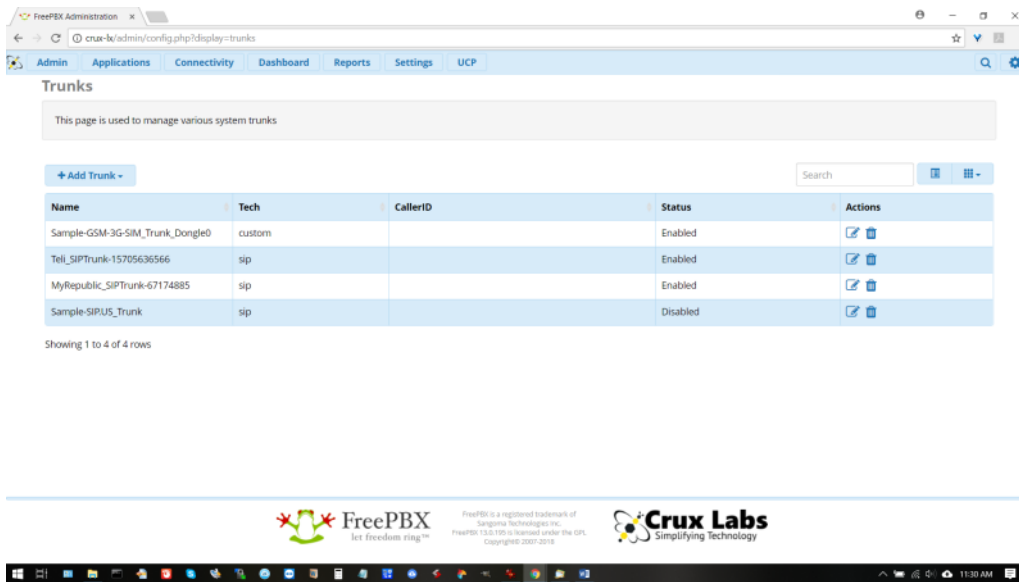
Add a Pre-configured SIP Trunk from a Template

As Crux LX deployments and partnerships are increasing, the list of tested service providers of GSM and SIP trunks are also increasing. Once deployed with a SIP trunk provider, in the subsequent release of the product, additional templates are added to aid the setup process, ensuring that setup of a new SIP trunk of a known provider takes just 5-10 mins.

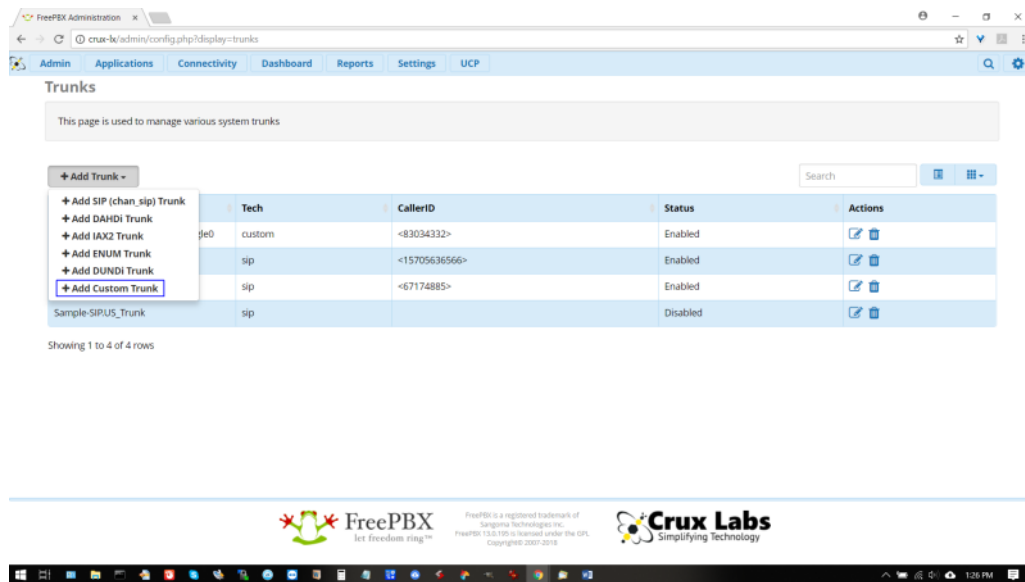
- a) Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- b) Select Connectivity -> Trunks
- c) Select from the list of templates listed -> Duplicate it and edit the copy created according to your SIP trunk subscription.

Add and configure a New GSM or SIP Trunk without Template

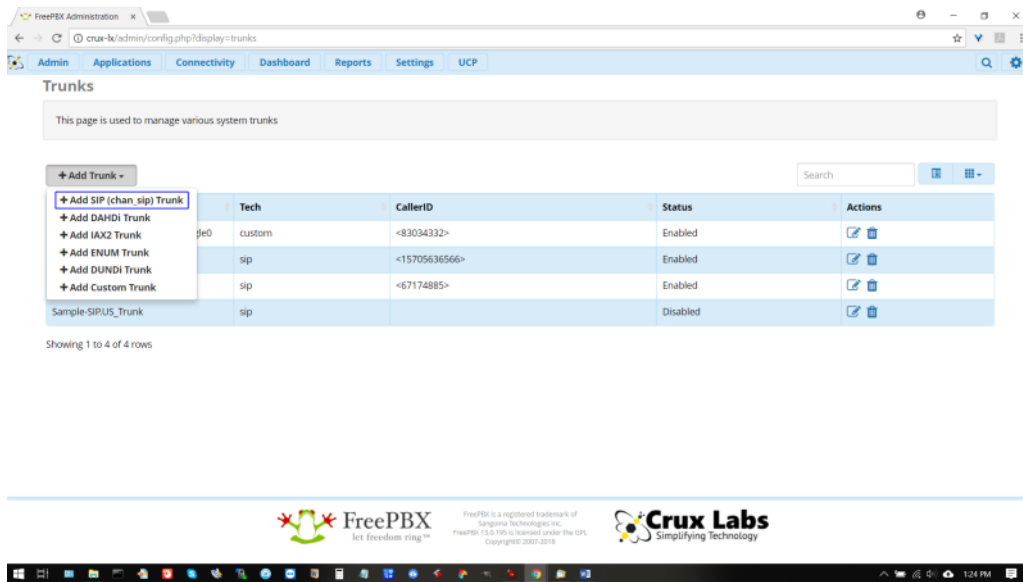
- a) Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- b) Select Connectivity -> Trunks



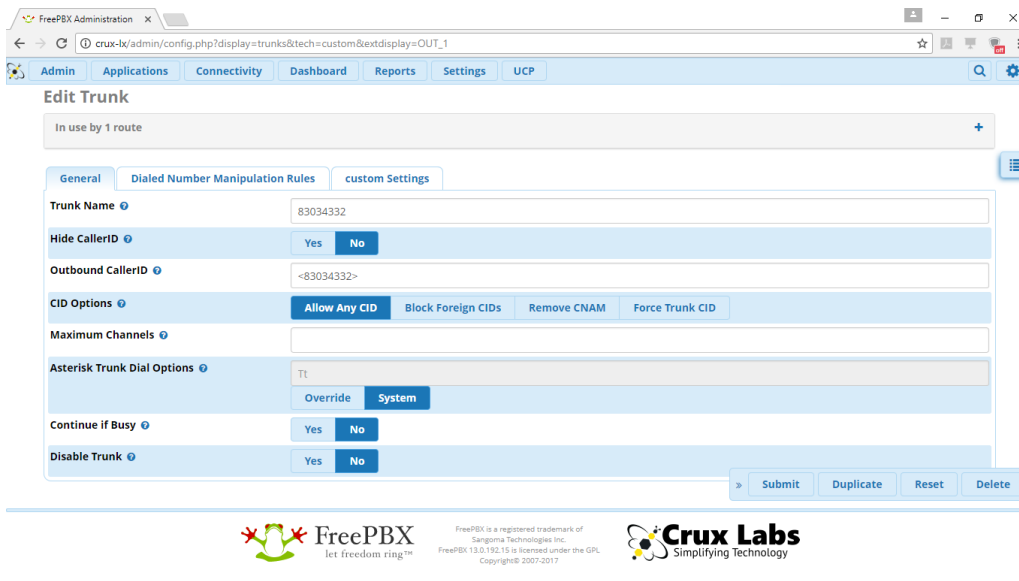
c) For setting up a GSM Trunk – first ensure steps in section “Additional steps for setting up a GSM Trunk Line” are followed. Then, Select “+ Add Custom Trunk” from the “+Add Trunk” drop down list or alternatively, select Sample-GSM trunk template



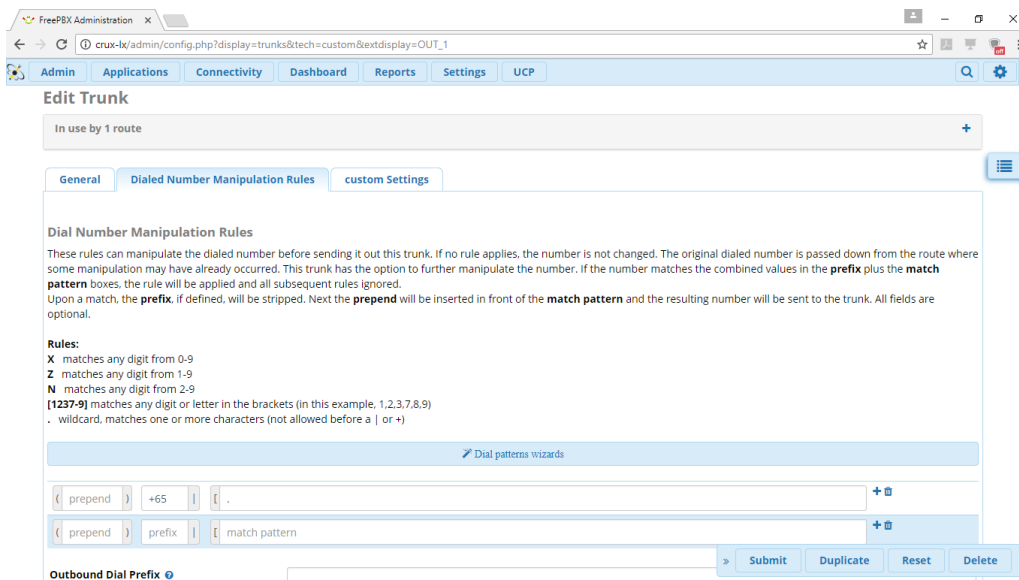
d) For setting up a SIP Trunk - Select “+ Add SIP (chan_sip) Trunk” from the “+Add Trunk” drop down list or alternatively, select Sample-SIP.Trunk trunk template



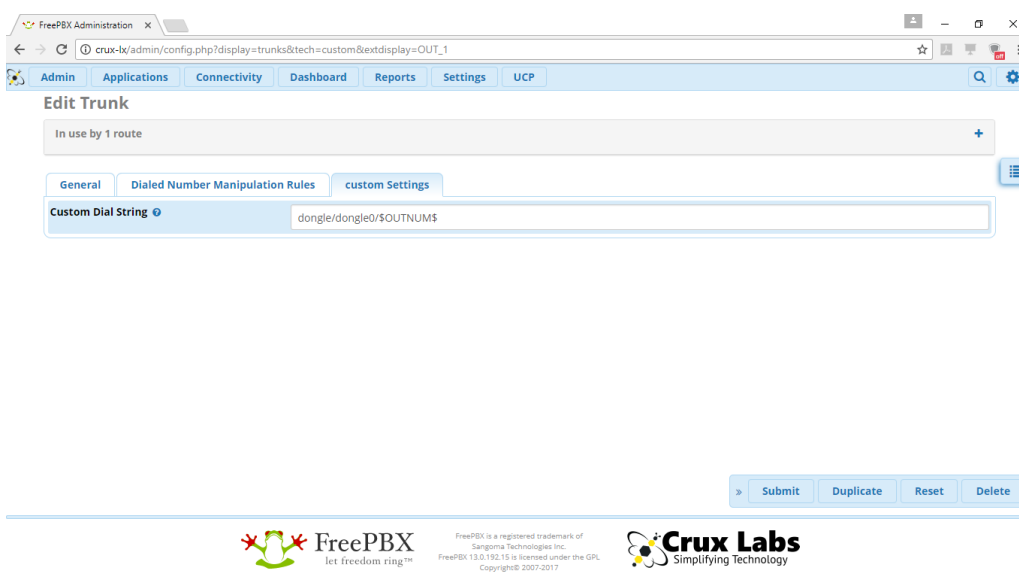
- e) On the General settings tab - Click Duplicate to create a copy. *It is a good practice to duplicate a config so that you always have a pristine configuration to fall back on or for future use.*
- f) Give the Trunk line a name.
- g) Add the Caller ID that should show at the call recipient's end (typically the Caller ID of the line)



- h) On the Dialed Number Manipulation Rules settings tab - setup the dialplan – ie. how do you expect users to dial using this trunk line. *Commonly, you can prefix a "0" or a "9", followed by the local number to call. This can be achieved by putting "0" in the Prefix column and a "." (dot) in the number column. This essentially means that when the user dials a number that is preceded by a 0, the remaining number is the number to be dialed.*



- i) For setting up a GSM Trunk – Select the third tab “custom settings”. In custom settings, update the number of dongle corresponding to this trunk line. This is the same number corresponding to the [dongle0] created in step one in dongle_custom.conf file. The final line should read like dongle/dongle0/\$OUTNUM\$ with the same dongle number highlighted in yellow. If it is the third dongle added, then it would be 3.

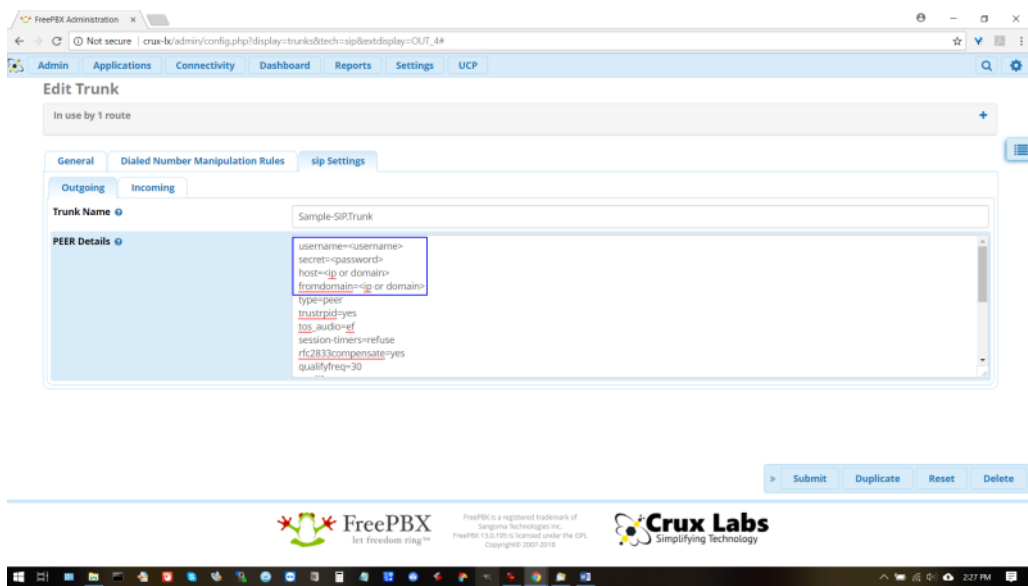


- j) For setting up a SIP Trunk – Select the third tab “sip settings”.
- k) If not using a template, typically following parameters should work with updated credentials.

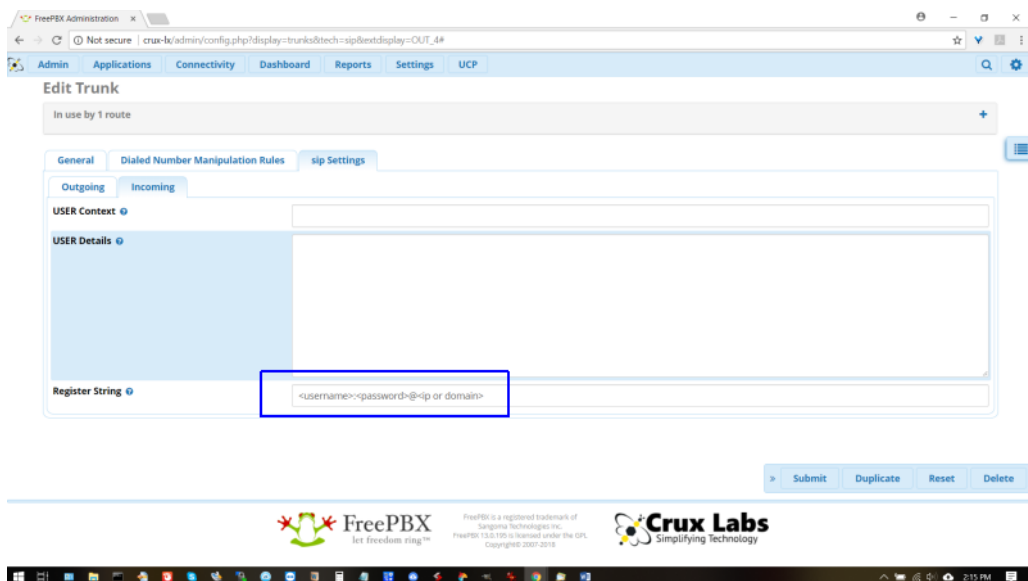
username=<username>
secret=<password>
host=<ip or domain>
fromdomain=<ip or domain>
type=peer
trustpid=yes
tos_audio=ef
session-timers=refuse

rfc2833compensate=yes
qualifyfreq=30
qualify=yes
port=5060
nat=yes
insecure=port,invite
dtmfmode=rfc2833
disallow=all
context=from-trunk
canreinvite=no
allow=ulaw&g729

- l) If using a template, following fields should point to the SIP Trunk **username**, **password** (called *secret*) and IP/Domain in the fields **host** and **fromdomain**. This information is provided by the SIP Trunk provider.



Outgoing tab



Incoming tab

Set Outbound Routes

- Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- Select Connectivity -> Outbound Routes to add an Outbound route using this trunk.
- Refer screens below with blue boxes as indicators to the relevant sections that need updates. It is similar to what has been done in the previous step. Some of the information may be repeating here, but the key is to set the Trunk dial order. Supposing you have 3 trunk lines and you want to set a order of preference on its usage based on availability of the line – this is where it is to be done. Including if this trunk is available according to Time Groups (say during working hours only), etc.
- Match same dialplan previously added, in “dial patterns” tab here.
- Click the small “?” next to each option to get quick help on what that option does.

192.168.45.1/admin/config.php?display=trunks

Admin Applications Connectivity Dashboard Reports Settings UCP

Trunks

This page is used to manage various system trunks

+ Add Trunk +

Tech	CallerID	Status	Actions
custom	<83034332>	Enabled	
sip	<31091801>	Enabled	

FreePBX let freedom ring™

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192.168.45.1/admin/config.php?display=trunks&tech=CUSTOM

Step 1

192.168.45.1/admin/config.php?display=routing&view=form&id=1

Admin Applications Connectivity Dashboard Reports Settings UCP

Outbound Routes

Edit Route

Route Settings Dial Patterns Import/Export Patterns Additional Settings

Route Name 83034332

Route CID <83034332>

Override Extension Yes No

Route Password

Route Type Emergency Intra-Company

Music On Hold? default

Time Group --Permanent Route--

Route Position --No Change--

Trunk Sequence for Matched Routes 83034332

Optional Destination on Congestion Normal Congestion

Submit Duplicate Reset Delete

Step 2

- Select Submit, followed by Apply Config.

Set Inbound Routes

- Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- Select Connectivity -> Incoming Routes and add an inbound route as follows.
- There is a default Inbound Route pre-configured to ring a Ring Group 401 (comprising extension numbers 200-205) to parallelly ring all incoming calls. This can be altered to point to an IVR based on Time Groups and Schedules or pointed to Voicemail Extensions etc.

NOTE – You could click the small “?” next to each option to get quick help on what that option does.

The screenshot shows the 'Inbound Routes' configuration page in FreePBX. The route is identified as '83034332'. The 'General' tab is active, showing fields for Description, DID Number, CallerID Number, CID Priority Route, Alert Info, Ringer Volume Override, CID name prefix, Music On Hold, and Set Destination. The 'Set Destination' is set to 'IVR' with a dropdown menu showing 'White House Landing'. Buttons for 'Submit', 'Reset', and 'Delete' are visible at the bottom right. The footer includes logos for FreePBX and Crux Labs.

- Select Submit, followed by Apply Config.

How to check Registration Status of SIP Trunks

- Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- Select Reports -> Asterisk Info -> Chan_Sip Info; The SIP trunks registration status will show on this page.

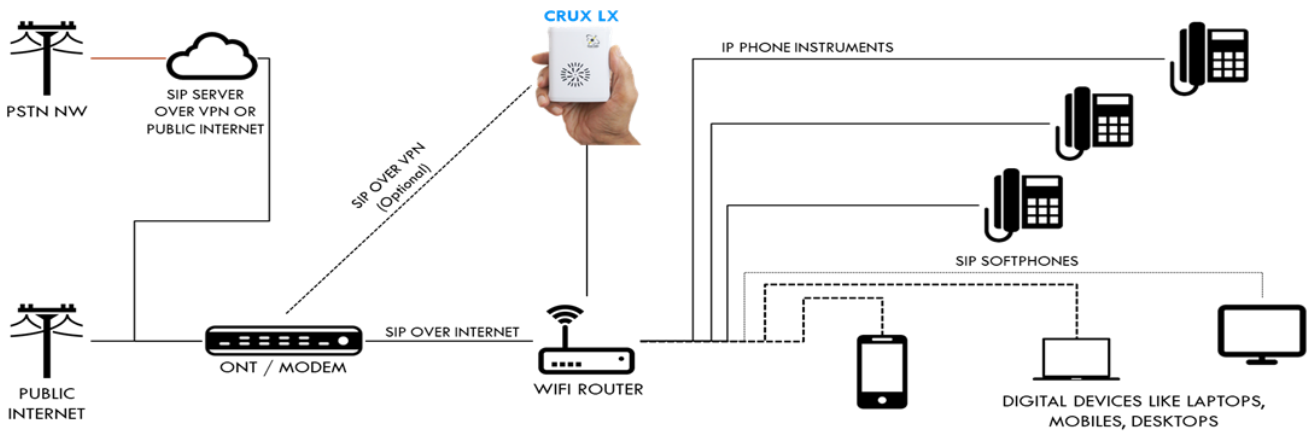
The screenshot shows the 'Chan_Sip Info' page in FreePBX. It displays a table of SIP trunk registration details. The 'Chan_Sip Registry' section is highlighted with a blue box. The table shows the following data:

Host	dsmgr	Username	Refresh State	Reg. Time
sip.myrepublic.com.sg:5060	Y	62174885	185 Registered	Sun, 29 Jul 2018 22:16:15
cruxlabsteld.vy14.siprr.net:5060	Y	cruxlabs	185 Registered	Sun, 29 Jul 2018 22:17:31

Below the registry table, it indicates '2 SIP registrations.' The 'Chan_Sip Peers' section is also visible at the bottom of the page.

Configuring a Loopback SIP Trunk

Crux LX works with SIP trunks that are configured over public internet as well as in loopback configurations followed by some of the telecom companies like Singtel in Singapore. The deployment scenario is as indicated in figure below with SIP over VPN enabled by enabling an additional port on the Optical Network Terminal (ONT), also called the Fibre Modem.



To support this configuration, Crux LX requires two WAN ports – one to connect to the Router or Switch and the other to connect directly to the ONT for the SIP Trunk connectivity. Crux LX has one native Ethernet 10/100 Mbps port. The other four USB 2.0 ports can be easily converted to up to four additional Ethernet 10/100 Mbps ports using an inexpensive USB 2.0 to Ethernet 10/100 Mbps converters available in the market or you could procure one from Crux Labs. Before adding the hardware and plugging in the cable connecting the ONT, following network configuration needs to be carried out on Crux LX and re-booted.

Before you carry out this configuration, ensure that the SIP trunk provider has provided you the following information:

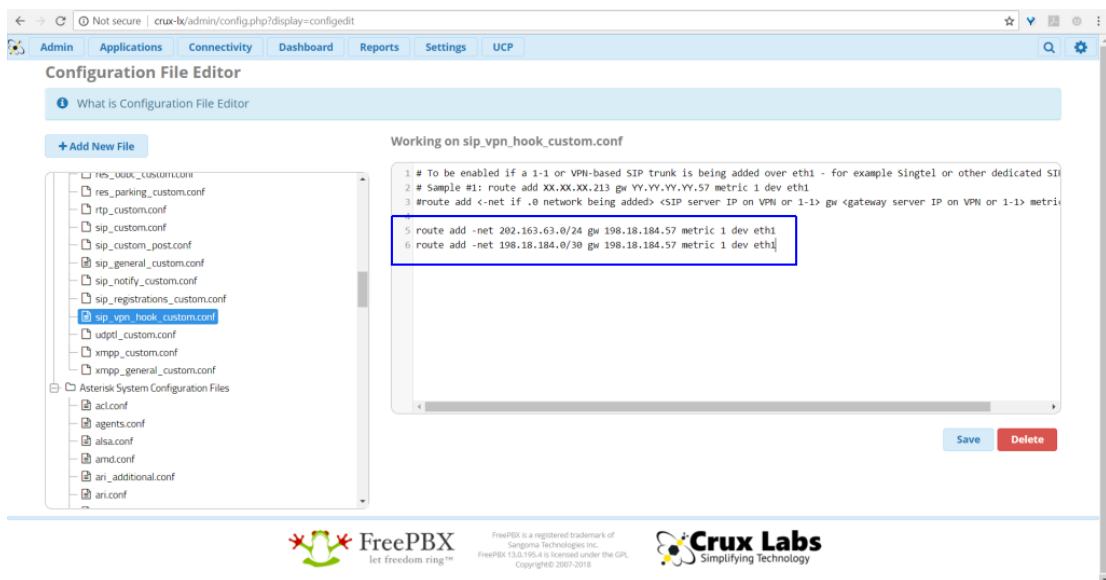
- 1) **Private IP** address assigned to your SIP connection
- 2) Loopback or **Gateway IP** for reaching the SIP server
- 3) **SIP server IP** address

Based on the above, following can be derived:

- 1) **Gateway Network**. For example, if Gateway IP is 178.176.189.11 then Gateway Network is 178.176.189.0/24
- 2) **SIP Server Network**. For example, if SIP Server IP is 232.14.7.221 then Gateway Network is 232.14.7.0/24

Configuring Network services on Crux LX for Loopback SIP trunk

- a) Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- b) Select Admin -> Config Edit -> Scroll to sip_vpn_hook_custom.conf file



c) Add following two lines to the file at the bottom as indicated above:

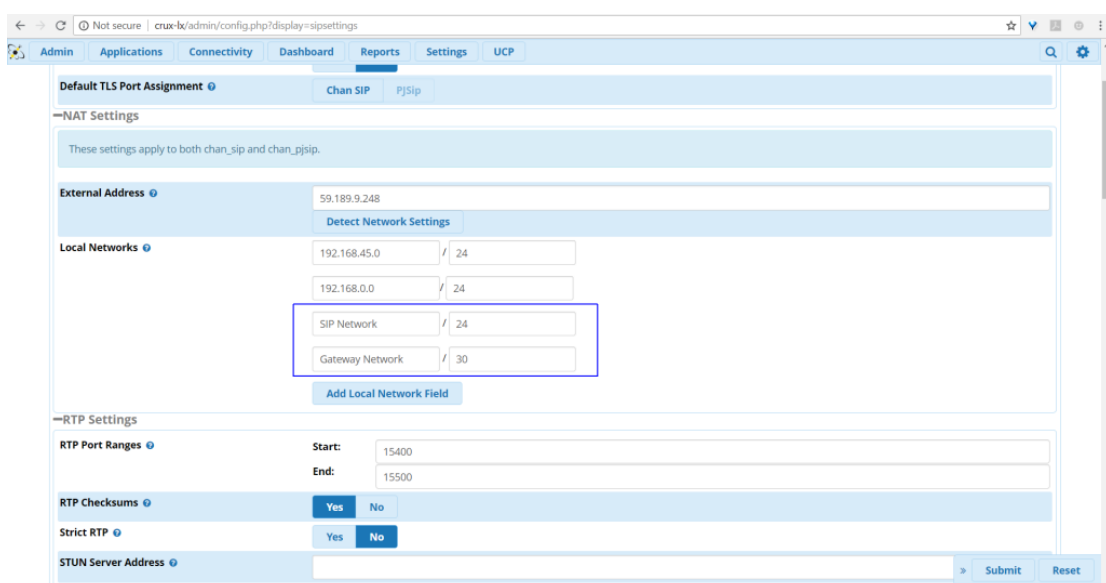
```
route add -net SIP Network gw Gateway IP metric 1 dev eth1
route add -net Gateway Network gw Gateway IP metric 1 dev eth1
```

For example, Singtel configuration typically looks like as below:

```
route add -net 202.163.63.0/24 gw 198.18.184.57 metric 1 dev eth1
route add -net 198.18.184.0/30 gw 198.18.184.57 metric 1 dev eth1
```

PLEASE NOTE – If there are multiple IP addresses provided for signalling and media for SIP Server by the telecom provider, then ensure that additional configuration lines are added to cover all mentioned private networks of the telecom provider. For example Singtel uses two separate IP addresses for media and signalling but both IPs belong to the same network, hence, that ensures routing for both the IP addresses.

- d) Save and Apply Config.
- e) Next, we need to indicate to Crux LX that this SIP network is to be treated as local network.
- f) Click Settings -> Asterisk SIP Settings
- g) Add SIP Network and Gateway Network to list of local networks; Submit & Apply Config.



- h) Next, we need to add Network configuration for the second ethernet port added ie. “eth1”.
- i) Login as Admin into the WiFi portal (Refer Accessing Crux LX Admin portals)
- j) Navigate to Advanced NW Config and add following block of configuration. Remember to replace the Gateway IP and Private IP with actual IP addresses provided by your telecom provider.

eth1 Static IP - Loopback SIP server configuration

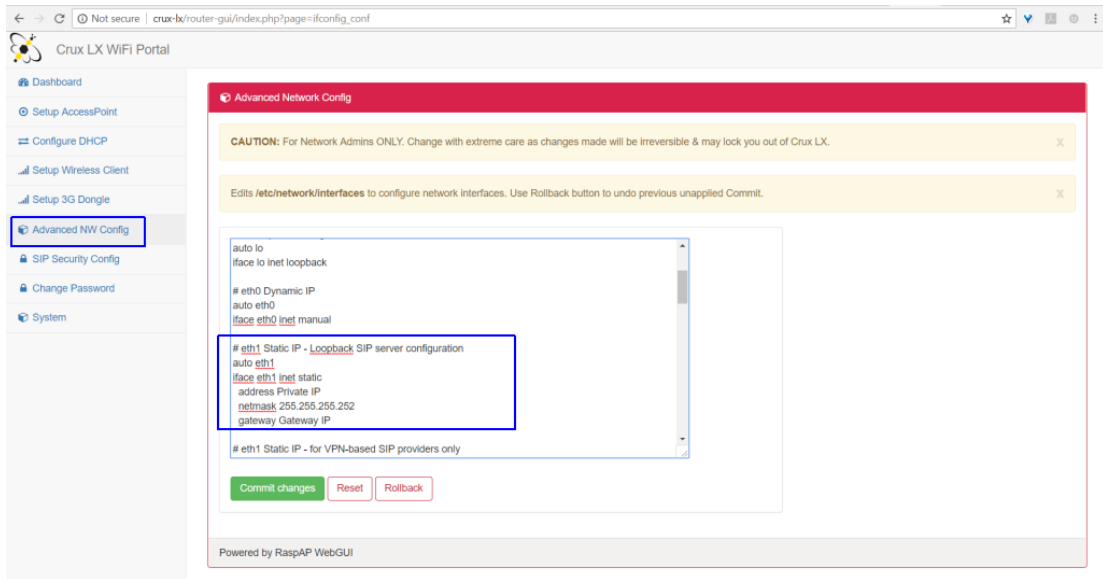
auto eth1

iface eth1 inet static

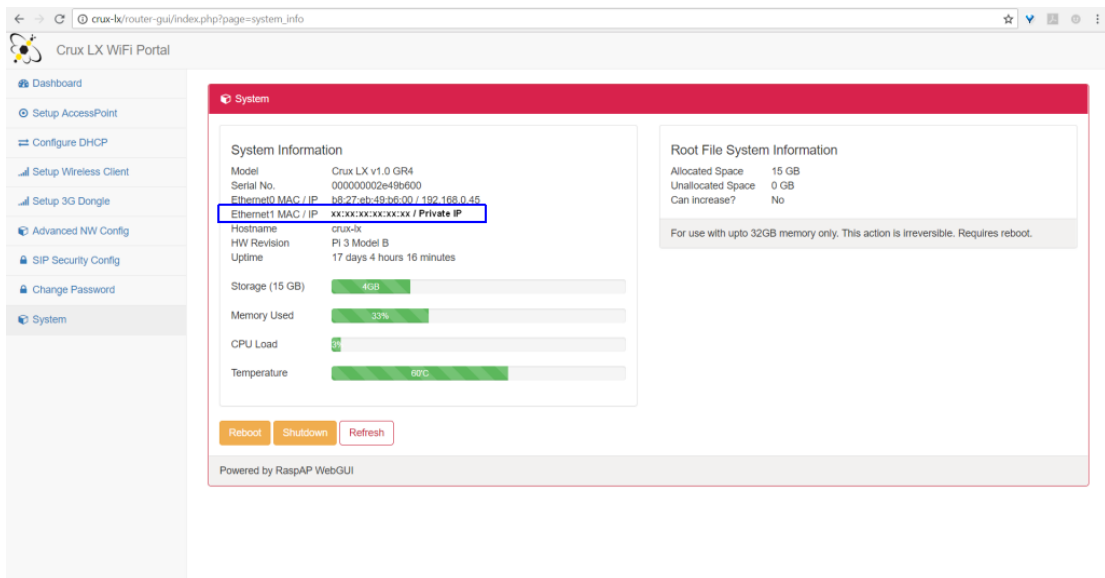
address **Private IP**

netmask 255.255.255.252

gateway **Gateway IP**



- k) Commit Changes; Then Navigate to System menu and “Reboot” Crux LX.
- l) At this point, you must connect the ONT Ethernet port for SIP Loopback to Crux LX USB to Ethernet converter port.
- m) Once Crux LX re-starts and the SIP Loopback from ONT is connected, visit the System page again and ensure that the Ethernet 1 interface is pointing to the Private IP.



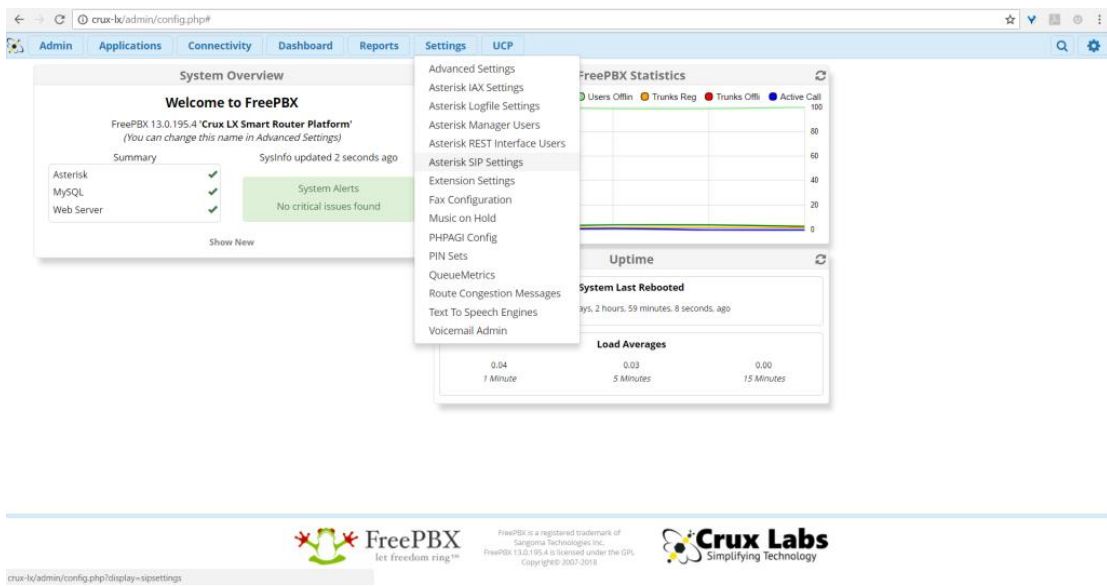
How to connect remote users to Crux LX

Crux LX allows users to connect and register their SIP client app from the local area network (when inside office or home) or via internet (when outside the office or home). Local access is enabled by default and you may have used it by now. However, Crux LX requires to be exposed on the internet if you expect to have remote users connecting to Crux LX from across the world over internet. Enabling this requires a few simple steps.

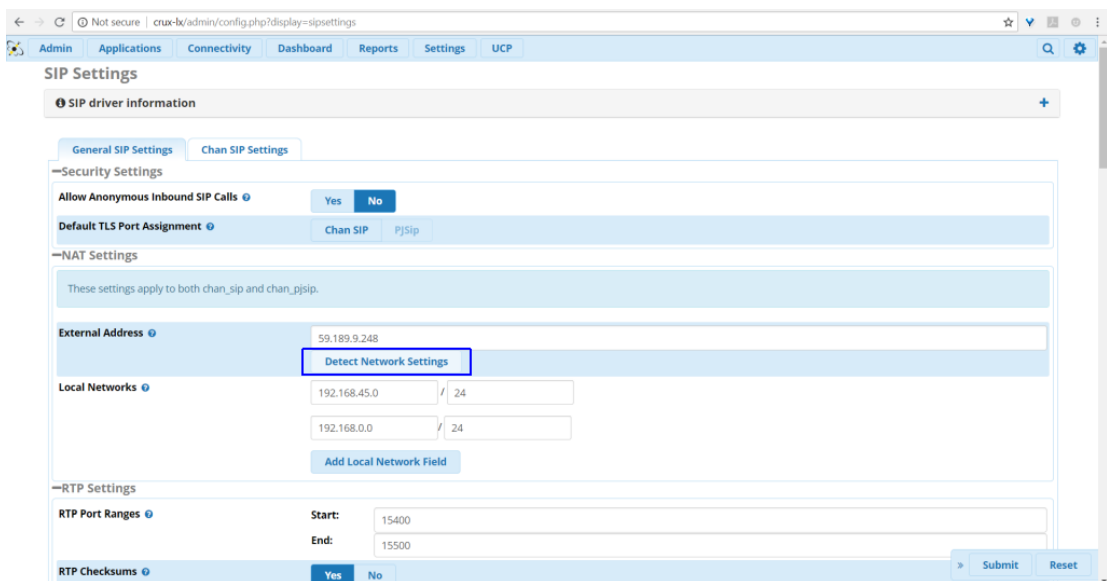
Steps to expose Crux LX on the internet

When setting up a GSM Trunk line, a few additional steps need to be followed, prior to adding the GSM Trunk. This is to ensure that the GSM dongle and SIM are authenticated for use.

- Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- Select in the menu, Settings -> Asterisk SIP Settings

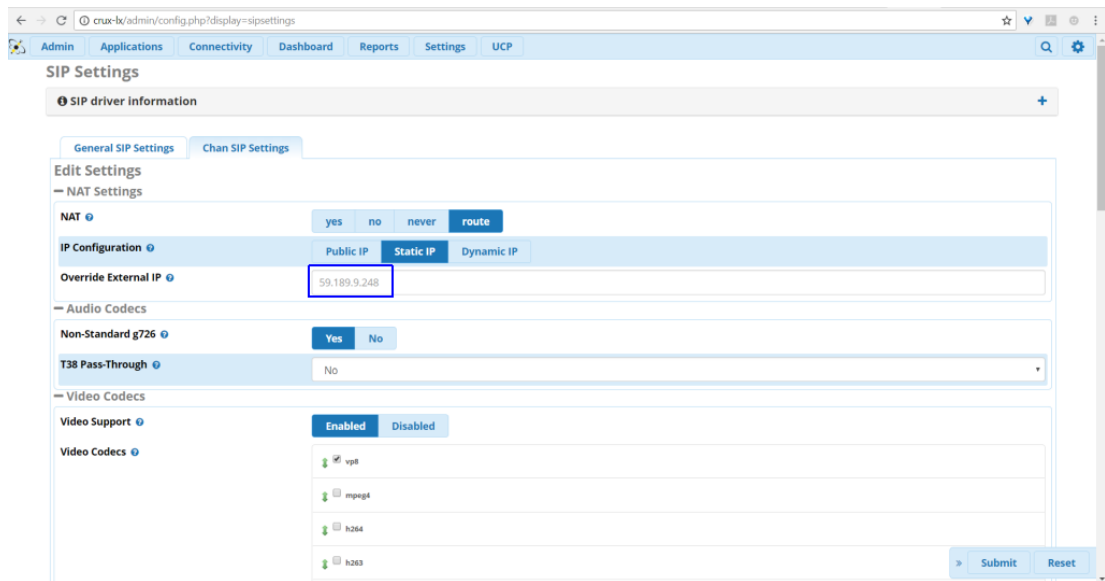


- Click "Detect Network Settings"



- The Internet Service Provider (ISP) assigned public domain IP address to your modem and router will appear here. Submit and Apply Config post this step.

- e) Next, Click on Chan SIP Settings tab and ensure that the same IP address is visible in the “Override External IP” setting as well. If it is not the same, ensure that IP Configuration is set to Static IP and delete any other IP address explicitly mentioned in the Override External IP text box. Then Submit and Apply Config and re-verify that the IP address is not correctly pointed to the same as in step c & d.



- f) Post this step, remote users can connect to Crux LX by using this IP as the Domain while registering their SIP Client Apps like Linphone or Zoiper. The username and password will continue to remain same. There is no impact of making Crux LX visible on internet on local users who can continue to use local IP address of Crux LX to connect.

PLEASE NOTE – When Crux LX is NOT connected directly to your modem over RJ45 (Ethernet or LAN) cable but to another Router or DHCP source, please ensure that the SIP Port (default port is 5060 UDP) as well as RTP ports default 15000 – 16000) are not blocked by firewall and are being forwarded from the Router or DHCP source to Crux LX, otherwise registration of remote SIP clients will not go through and/or there may be audio problems when calls do connect. If the remote users are registered and calls with remote users are ringing then the SIP Port is being forwarded accurately. If there are audio problems, then one possible problem could be the RTP ports not being correctly forwarded to Crux LX.

IMPORTANT

Remember to change all default passwords in Crux before you start configuring it for use. It is critical to change following passwords:

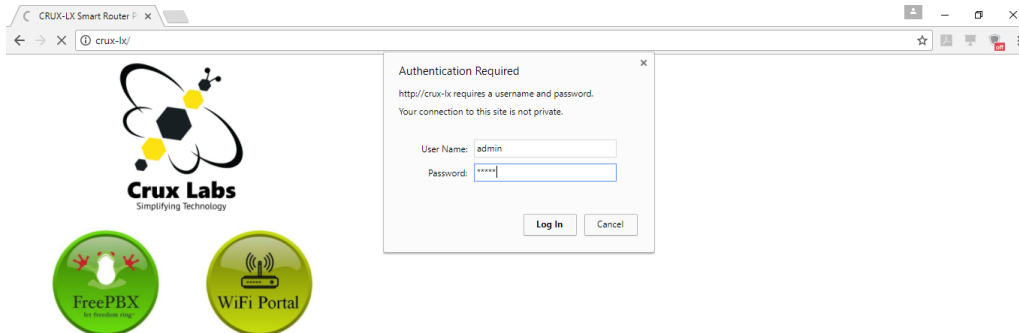
- FreePBX admin user
- WiFi Portal admin user
- Passwords for default extensions 200 to 299

Always use a strong password for all the above users

7. Crux LX Guide to WiFi (AP and Router) functions

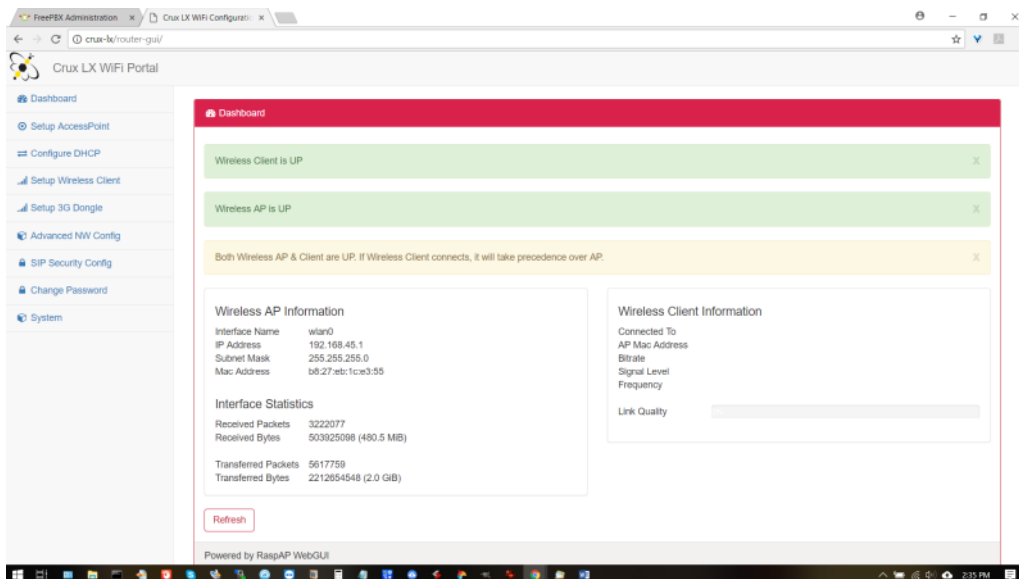
Setting up Crux LX with internet over GSM (SIM card data plan)

- Pre-Step: Insert the SIM card into the dongle and connect the dongle to the router, on any of the four available USB ports or a powered USB hub connected to Crux LX.*
- Login as Admin into the WiFi portal (Refer Accessing Crux LX Admin portals)



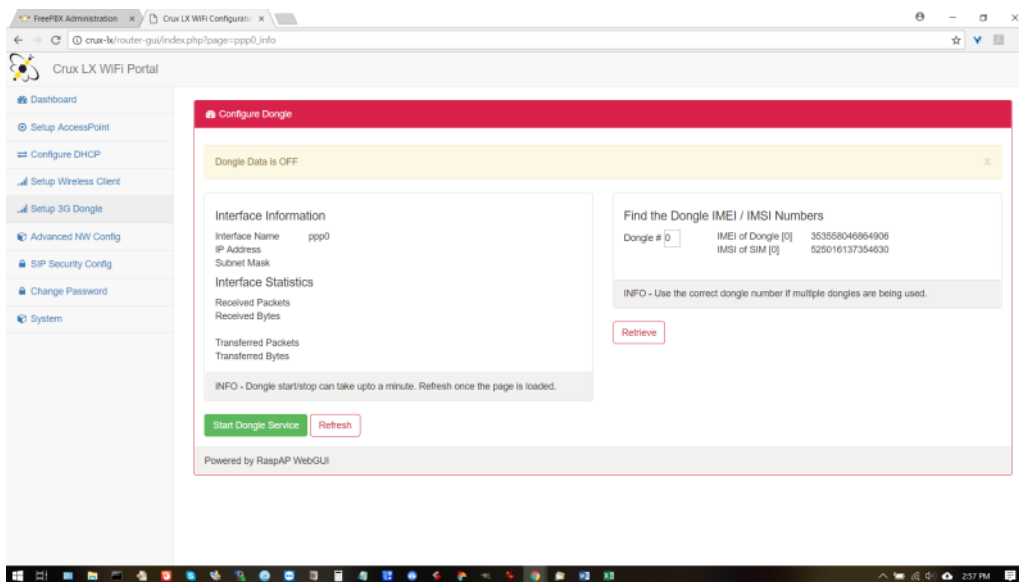
crux-lx/router-gui/

Login Screen

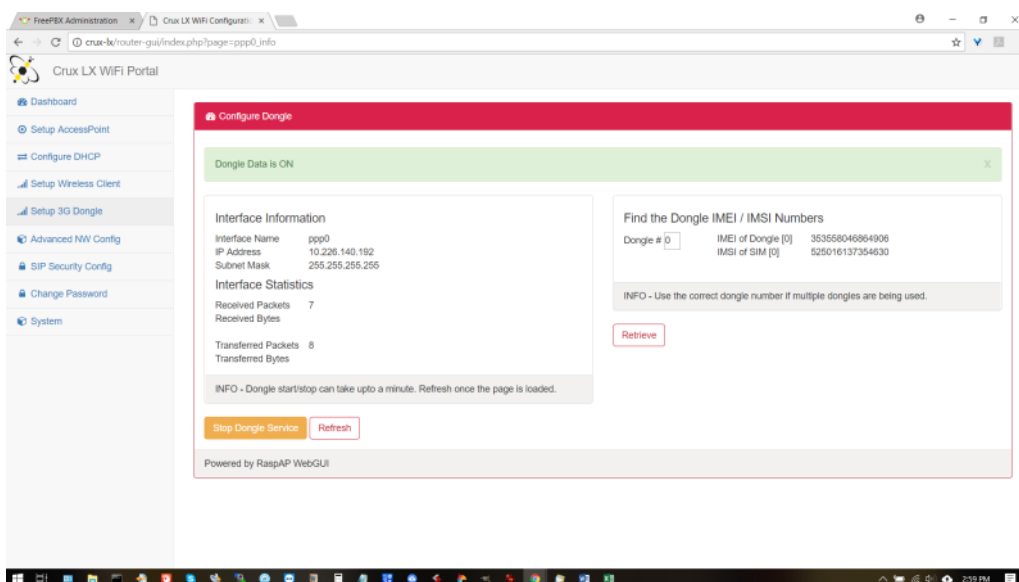


Dashboard

- Click "Setup 3G Dongle" tab from the menu on the left
- Click "Start Dongle Service" (Turning ON the data can take up to a minute. Be patient and wait for page to return. Then press Refresh to update details.)



e) At this stage, it should state “Dongle Data is ON” and details populated. Physically, a successful data connection is indicated by a solid Blue or Green light on the Dongle. Blue indicates 3G, while Green indicates 2G.



NOTE –Currently only Crux Labs’ provided Huawei E1750/E1752 3G Dongle is supported with Crux LX for simultaneous use for Voice and Data (Receive or make calls on the SIM trunk while browsing). Other Dongles that are supported on Linux may or may not work.

NOTE –If you Power-on Crux LX “after” connecting the dongle with the SIM in it, Crux LX comes up with the data sharing turned “ON” and ready internet access. This way one avoids accessing the portal to explicitly turn ON Dongle data plan.

Setting up Crux LX with internet over Ethernet (Wire)

a) Connect the Ethernet cable from an IP serving device like a switch or a router, directly from the networking device or from a wall socket, to the Ethernet port on Crux LX.

- b) Make a note of the IP address provided to Crux LX or preferably, assign it a static IP address, since this IP address will be required for a few other configuration steps, especially when accessing the portal or registering mobile devices on the Intercom.

Connecting Crux LX with existing LAN

Wired connectivity to LAN

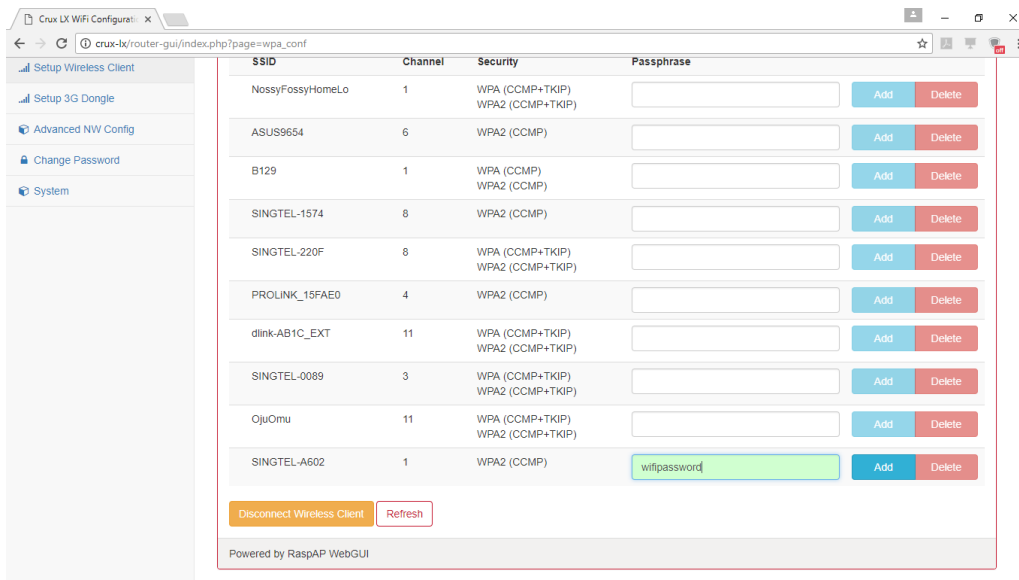
No special configuration needed. Follow steps as described in section “Setting up Crux LX with internet over Ethernet (Wire)”

Wireless connectivity to LAN

While Crux LX can also be connected to LAN wirelessly, it is not recommended since operations and QoS of other connected services, like SIP trunks, can get impacted when there are fluctuations in signal strength due to environmental reasons. It is best to connect Crux LX to internet over a wired connection and use as a WiFi Router/AP.

At any given time, Crux LX can be either connected over wireless as a client or work as a WiFi Router/AP. It cannot be both at the same time. If both are WiFi Router/AP and Client configs are enabled, then as soon as Wireless credentials are added to connect as a wireless client, AP will get turned off.

- Login as Admin into the WiFi portal (Refer Accessing Crux LX Admin portals)
- Select Setup Wireless Client.
- Refresh the list of available networks; Enter credentials; Click Add.



SIP Security Config

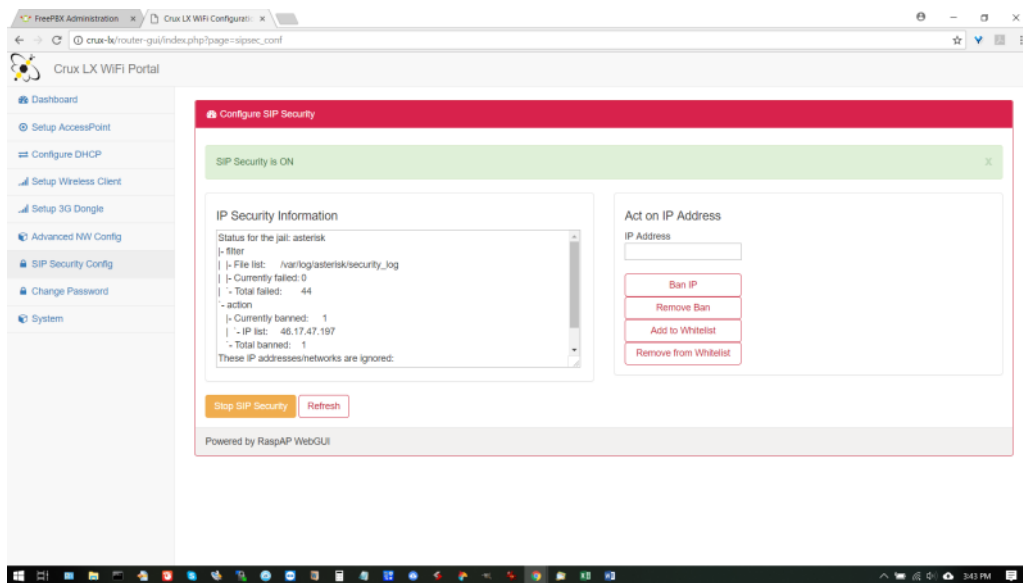
When you would like your users to be able to make and receive calls from Trunk lines connected to Crux LX and other users, when they are not physically co-located with Crux LX, then Crux LX will need to be forwarded SIP traffic being received by your edge Router (it could be Crux LX, if directly connected to modem and acting as Primary router). This is done by forwarding the traffic on the port being used for SIP on Crux LX (*default is 5060*).

This, however, is a security risk since there are many hackers looking to find insecure systems that would allow them access to make free telephone calls. Given 5060 is the default port for most SIP providers, it does attract hacking attempts.

To counter this, Crux LX has an added brute-force recognition mechanism, as well as manual interfaces to force ban or unban IP addresses, or add or remove IPs to a Whitelist (or ignore list). SIP Security is **ON** by default.

How to check SIP Security Config

- a) Login as Admin into the WiFi portal (Refer Accessing Crux LX Admin portals)
- b) Click SIP Security Config

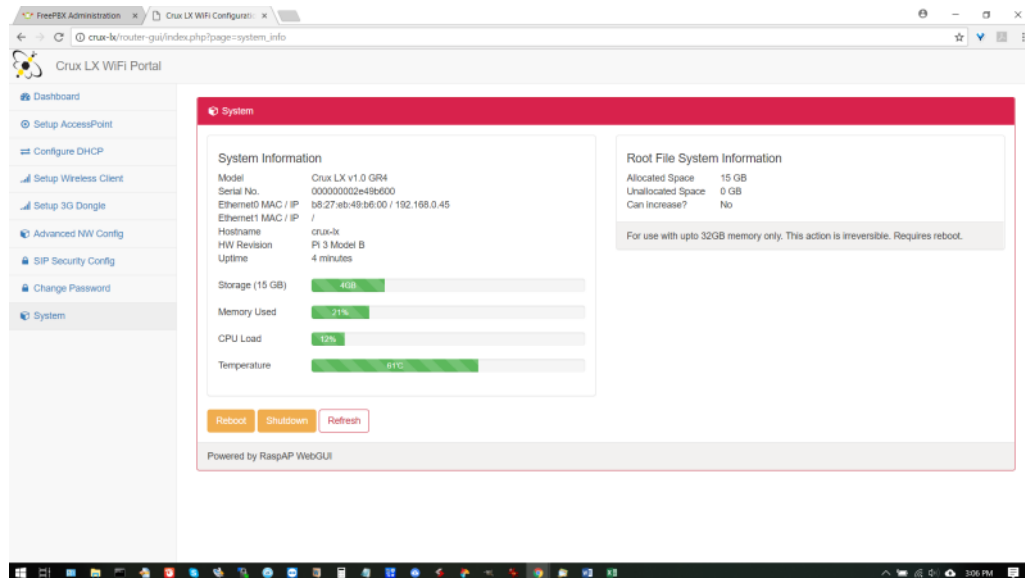


Functions and Information on Systems Page

Important information and functions like buttons to power off or reboot Crux LX are provided on the System Page. It also provides important information about the health of Crux LX unit, like CPU and Memory utilization levels, Temperature and Storage space metrics. This page also lists product details including the serial number, model and revision details.

How to check System Information

- Log in as Admin into the WiFi portal (Refer Accessing Crux LX Admin portals)
- Click System



Default SSID & Password for Crux LX

- Default SSID: CRUX-LX-WiFi-SSID
- Default Password: cruxwifi

Changing Default SSID & Password for Crux LX

- These can be changed at <http://192.168.45.1/> or <http://cru-x/>
- Select WiFi Portal
- Click Setup AccessPoint from the menu on the left; Then select Security tab. Make changes then Save settings

Other Important Default Logins and Passwords

Default login to WiFi Portal

- Default login: admin
- Default password: admin

Default login to FreePBX Portal

- Default login: admin
- Default password: admin

Default Password for pre-configured extensions 200-299

- Default password: crux1234

Crux LX WiFi Configure: x

crux-lx/router-gui/index.php?page=hostapd_conf

Crux LX WiFi Portal

- Dashboard
- Setup AccessPoint
- Configure DHCP
- Setup Wireless Client
- Setup 3G Dongle
- Advanced NW Config
- Change Password
- System

Configure Wireless AccessPoint (AP)

Wireless AP is ON

Basic Security Advanced

Basic settings

Interface
wlan0

SSID
CRUX-LX-WIFI-SSID

Wireless Mode
g

Channel
12

Stop Wireless AP Save settings Refresh

Powered by RaspAP WebGUI

Crux LX WiFi Configure: x

crux-lx/router-gui/index.php?page=hostapd_conf

Crux LX WiFi Portal

- Dashboard
- Setup AccessPoint
- Configure DHCP
- Setup Wireless Client
- Setup 3G Dongle
- Advanced NW Config
- Change Password
- System

Configure Wireless AccessPoint (AP)

Wireless AP is ON

Basic Security Advanced

Security settings

Security type
WPA2

Encryption Type
CCMP

PSK
cruxwifi

Stop Wireless AP Save settings Refresh

Powered by RaspAP WebGUI

8. FAQs

How does Crux LX work?

Crux LX is a plug-and-play device as it comes pre-configured for most common needs. It just needs to be powered on, and like any other Access Point (AP) or router, its wireless radio or SSID (as described on the box) is available for devices to connect. For it to connect to internet it needs a wired ethernet (RJ45) connector coming from your cable or fiber modem, as you would with any other AP or router. A quick reference guide is available for download from our website using which you can easily start distributing the 100 pre-configured extension numbers to users. For voice communication, Crux LX acts like a SIP server. To connect to this and start using voice, you could download any of the SIP client application or softphone application that allows you to input three key data points (1) Extension number (2) Password (3) IP Address of Crux LX. These three credentials allow a SIP client to register with Crux LX and you are ready to call one another!

How many users can each unit of Crux LX device manage or how can I size my requirement?

Each Crux LX unit can connect up to 250 users though one can configure thousands of extensions on a single unit, if the unit is being used only as an IP-PBX and not as a data router. Browsing needs and patterns can be very different, especially if audio visual content is permissible. The limiting factor however is the expected concurrency. Each Crux LX unit can support up to 20 concurrent conversations. However, you may require multiple Crux LX devices if you expect to connect more than 250 users or require more concurrency. You may also require some additional access points to span the space to connect large number of users who may have a mixed usage (Crux LX as well as regular browsing needs).

Does Crux LX require internet?

Internet is not a requirement for Crux LX when operating autonomously, say for example when Crux LX is being used as a Wireless Intercom. However, when SIP trunks or multiple Crux LX devices are to be inter-networked to connect multiple branch offices, then internet will be required and quality / bandwidth of internet connection will be of importance. It will play a significant role in quality of voice and service delivered by Crux LX for communication over such channels. You may also require some additional networking components based on such use cases.

How do I reach Crux Labs to help me make an assessment of my needs?

You can fill up a brief questionnaire that will get the responses to Crux Labs. You will likely receive a response within 24 hours. Here's the link to the questionnaire - <https://goo.gl/forms/2VEDEOAZZdhRELXu1>

How much area does the WiFi radio on Crux LX cover?

Crux LX has a circular internal antenna. In our tests, beta trials and few customer deployments, the coverage ranges between 20 - 30 meters spherical radius. However, wireless signal can vary drastically based on construction and use of glass and metal. Typically scaling beyond one floor above or below, or 10,000 square feet of horizontal space will require additional Wireless Repeaters or Access Points. Crux LX pairs well with D-Link DIR-816 which is an inexpensive router (retails for \$40-50) that works well as a repeater that provides good ground coverage and well suited for this use.

How much power does Crux LX require?

Crux LX requires 2.5A, 5.1V over a Micro USB B type port. Crux LX is shipped with a Universal Power Supply 2.5A, 5.1V, Micro USB B, with a non-detachable 1.5m Cable.

What power sources can we use to power up Crux LX?

Most android mobile phone chargers may not suffice as the maximum power they support is typically 1A. Similar is true with battery banks. However, some battery banks or chargers that do provide a 2A / 2.5A port for fast charging and those can power up Crux LX unit too. At Crux Labs, we use a battery bank with a 2A port option for demo purposes all the time. A 5,000 mAh battery bank keeps Crux LX unit powered up for 6-8 hours, depending upon number of devices (GSM dongles, USB drives, etc) connected to it.

Does Crux LX support PSTN trunk (landlines)?

Crux LX works in conjunction with various other devices and technologies. At this time, PSTN/POTS (Landline) interface with Crux LX is supported but not offered since the interfacing dongle we are currently dependent on is not cost effective. And, given that PSTN is an old technology soon to be overtaken by SIP, we have prioritized having SIP support along with GSM, that benefits more number of customers. Please get in touch with us at info@crux-labs.com if you have a pressing need for PSTN/POTS support and are willing to shell out a few hundred bucks to get this support.

Do all users require a Smart Phone to access voice features of Crux LX?

Crux LX eliminates the need for additional instruments for voice communication. The easiest and convenient way is for users to use their Smart Phones (iOS or Android). However, depending on the need, the other supported options are (will need to be procured by you directly from open market) - Wired SIP or IP phones (may require additional networking equipment like Switches), Wireless SIP or IP Phones, Tabs, Desktops, Laptops or Mac.

Can I use Crux LX to connect multiple offices or connect when not in office?

Crux LX is capable of forming a closed loop communication amongst a group of trusted Crux LX devices over internet. This is done via Inter Asterisk Exchange setup that is supported by Crux LX. When deployed in this configuration, your New York office can call London office as though making a call within office though it will be routed over internet. This can be made secure by use of VPN software. Individual users can also connect to the Crux LX device in their office, even when not in office but connected to internet. In such a scenario, the user can make and receive calls even from outside, as though they were still present in office.

Can I experience a live demo of Crux LX?

Yes, a live demo of Crux LX is currently available. Singapore and USA based GSM and SIP trunk lines have been configured on the demo unit. One may experience it by dialling +1 408 498 9040 (provider is Teli) or +65 6717 4885 (provider is MyRepublic) for SIP and +65 8303 4332 for GSM (provider is Singtel). Calls made to any of these numbers will land on the same Crux LX device and will be greeted by the same message over an IVR that will guide you to punch 1 to speak with Crux Labs' founder, Rohit, or dial 2 to leave Crux Labs' team a voicemail message or feedback. This demo will give you an idea of things you can do with Crux LX, all by itself. In the demo, you'll note that Time Groups and Schedules are being used (9am to 11pm SGT - you

hear options, 11pm - 9am SGT you hear office closed), IVR (voice recorded on Crux LX through the Systems Recording interface and setup over IVR), SIP and GSM trunks, Ring Groups (when you dial 1, 5 extensions across the world will ring in parallel), Call Recordings and Voicemail (as soon as you leave a voicemail, an email is triggered to Crux Labs team that a voicemail has been left and Call Data Records (a complete auditable log of calls from origination to termination). Setting up this demo on a boxed unit took us about 1 hour, which included recording messages etc.

Which SIP clients does Crux LX support?

Crux LX works well with Linphone and Zoiper. We recommend Linphone given its tidy interface and capability to integrate chat and video calling through the same interface. It also has easy to use call forwarding and call conferencing feature on the dialpad screen that comes in very handy. It also allows multiple profiles to exist, which is quite useful when you wish to have one profile while in office and another that allows you to connect over internet, when you are not in office network.

What free and open source software does Crux LX use?

Crux LX in current form is fully built using open source hardware and software. The hardware uses a Raspberry Pi® board and the software includes Debian® operating system and a large set of software that accompanies the Debian® 2.8 distribution. Some of the key FOSS components that support the unified communication and management functionality are Asterisk®, FreePBX®, Chan_Dongle, and RaspAP Web GUI. These are being used under the realms of GPL, AGPL and LGPL licences. At Crux Labs, we have glued it all together along with our own set of modifications that have made Crux LX an easy to use and manageable device. Crux LX is Crux Labs' attempt to make open source work for non-techies in a way that is simplified, easy to manager and cost effective as compared to other commercial products available in the market. This endeavour could not be possible without the large community of open source contributors world-wide that has offered us this opportunity to make open-source consumable for the society.

Trademarks and Copyrights - Raspberry Pi®, Debian®, Asterisk®, FreePX® are respective registered trademarks of Raspberry Pi Foundation, Public Interest, Inc., Digium, Inc., and Sangoma Technologies."

How much storage is available on Crux LX device?

Crux LX works off a 16GB or 32GB microSD card. About 4GB of space is used by Crux LX software image. About 11GB of space is free and available to Crux LX 16GB model and about 26GB free space on 32GB model, that can be used for making backups, call detail records and call recordings, that can be backed up to a laptop/desktop from time to time.

What ports are available on Crux LX and what is their use?

Crux LX has 1 x 10/100 Mbps Ethernet port, 4 x USB 2.0 ports, 1 x Composite/Audio port (disabled), 1 x HDMI port (disabled) and 1 x Micro USB port - for Power. The 4 USB ports can be converted (with additional equipment that Crux Labs sells) to 10/100 Mbps Ethernet ports. This may be required to support SIP trunk configurations with some telecom providers like Singtel (Singapore), that require Crux LX to be connected to their physical ONT device for a 1-1 mapping to their SIP gateway.

Does Crux LX support DLNA® streaming?

Yes, any USB dongle with audio and video content on it, when connected to USB ports on your Crux LX, will appear as a DLNA source on DLNA-enabled players or directory services on android, windows and iOS/Mac platforms. The folder appears as "Crux LX Media Server" with sub folders "Browse Folders", "Music", "Video" and "Pictures".

When and where can I buy my Crux LX unit?

Visit <http://www.crux-labs.com/> or drop a line to info@crux-labs.com for buying options.

How will my Crux LX unit ship to me?

Our orders will ship from Singapore centre using Air service from one of the top-tier logistics providers - UPS, DHL or FedEx, depending on destination and shipment size. Tracking information will be provided where available.

How much are the shipping charges?

Shipping in Singapore is free of charge at this time. Shipping to all other locations may cost between S\$30 - S\$125 depending on delivery times, location, insurance, etc. A regular 7-10-day delivery courier costs ~S\$50.

Are there any duties or taxes payable?

In Singapore, Crux LX will not attract any customs duties or GST (at this time). To all other locations, Crux LX shipment will be subject to local customs duties and taxes that will need to be absorbed by backers themselves. Note that we cannot alter the value of our products in customs declarations. Hence, the value will be declared as the total value of the items contained in the shipment.

What is the warranty on Crux LX?

Crux LX comes with 1 year warranty on the hardware. There are no warranties on the software. Warranty includes Crux LX Base Unit, Power Adaptor, micro SD card, and GSM Dongles purchased from Crux Labs, subject to normal and indicated product use. The micro SD card shipped with Crux LX is non-transferrable and non-interchangeable. It should never be removed from its slot. Any deviations or tampering against this policy will void warranty.

What is your return or refunds policy?

Currently, we are unable to offer refunds or returns of Crux LX purchases. We can however help you make an informed assessment and decision, if Crux LX will be useful for your requirement. For starters, you may fill up a questionnaire to allow us to make a preliminary assessment. It can accessed from our website or directly at this link - <https://goo.gl/forms/2VEDEOAZZdhRELXu1>

9. Troubleshooting