

# 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	<b>Document Version</b>	<b>Crux LX Version</b>	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 multipleusers, 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 is 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 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



## 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

- a) If connected to Crux LX WiFi SSID point your browser to <u>http://192.168.45.1</u> or <u>http://crux-lx/</u>
- b) 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 <u>http://<WAN-IP>/</u> or <u>http://<DDNS>/</u> (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 <u>http://<WAN-IP>:10080/</u> or <u>http://<DDNS>:10080/</u>.



c) 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*)



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

Crux LX WiFi Configurati: ×					A	-	σ	>	<
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	Wireless Client is UP						x		I
al Setup Wireless Client									1
al Setup 3G Dongle	Wireless AP is UP						x		I
Advanced NW Config									1
Change Password	Both Wireless AP & Client are U	P. If Wireless Client connects, it will take pred	edence over AP.				x		I
System									1
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	Interface Name wian0		Connected To						1
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			Frequency						
	Interface Statistics		Link Quality						1
	Received Packets 3484		Crin Gouny						
	Received Bytes 1019941 (	996.0 KIB)							1
	Transferred Packets 1396								1
	Transferred Bytes 663556 (6	48.0 KIB)							
crux-lx/router-gui/index.php?page=ppp0_info									٣

## 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

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This assistant will help you configure and us SIP account.	se your
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USE LINPHONE ACCOUNT	]
USE SIP ACCOUNT	]
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#### d) Select "USE SIP ACCOUNT"

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DOMAIN		
192.168	3.45.1	
TRANSPOR	π	
	LOGIN	

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 <u>http://youtube.crux-labs.com</u> 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**

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

Admin Applications	Connectivit	y Dashboard	Reports		Settings	UCP			(	Q
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Asterisk CLI	elcome to F	FreePBX			Asteris	ik 🗸 🌘	Users Onlin 🔘 Users Offlin 🥚 Trunks Reg 🚺	Trunks Offli O Active Call		
Asterisk Phonebook	92.15 'Crux LX S	mart Router Platfor	m'		Uptim	e 🗸		100		
Backup & Restore	ange this name i	n Advanced Settings)						80		
Blacklist		Sysinfo updated 1	seconds ago		CPU	*		60		
Bulk Handler	<b>*</b>	System 41	arts		Memo	ry 👻		40		
CID Superfecta		No critical issue	erts es found		Disk	-		20		
CallerID Lookup Sources	· ·				Netwo	rk 👻				
Certificate Management	Show Al	I						0		
Config Edit				-			Uptime	C		
Contact Manager							Contrary Look Balance of			
Custom Destinations							System Last Rebooted			
Custom Extensions							4 hours, 24 minutes, 24 seconds, ago			
Feature Codes							Load Averages			
FreePBX Support						0.10	Loud Averages	0.10		
Module Admin						1 Minute	5 Minutes	15 Minutes		
Online Support										
Presence State										
REST API										
Sound Languages										
system Recordings										

#### c) 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.

Admin Applications Connectivity Da	board Reports Settings UCP	Q	1
Configuration File Editor			
What is Configuration File Editor			
+ Add New File	Working on extensions_custom.conf		
Asterisk Custom Configuration Files      Asterisk Custom Configuration Files      ari_general_custom.conf      crel_custom_conf      crel_custom_conf      crel_custom.conf      dongle_configuration.conf      dongle_custom.conf      dongle_custom.custom.conf      dongle_custom.conf      dongle_custom.conf      do	<pre>0 exten =&gt; ussd,n,Mangup() 1 1 [dongle-incoming] 1 include =&gt; dongle-incoming-sms 1 include =&gt; dongle-incoming-sms 1 include =&gt; dongle-incoming-ussd 1 1 10 exten =&gt; sms,n,System(scho "to: info@crux-labs.com/ns/bject: Incoming_SMS from \$(CALLERID(num)) \n\n\$(STRFITME(\$( 18 exten =&gt; sms,n,System(scho "to: info@crux-labs.com/ns/bject: Incoming_SMS from \$(CALLERID(num)) \n\n\$(STRFITME(\$( 19 exten =&gt; sms,n,System(scho "to: info@crux-labs.com/ns/bject: Incoming_SMS from \$(CALLERID(num)) \n\n\$(STRFITME(\$( 10 exten =&gt; sms,n,System(scho "to: info@crux-labs.com/ns/bject: Incoming_SMS from \$(CALLERID(num)) \n\n\$(STRFITME(\$( 19 exten =&gt; sms,n,System(scho "to: info@crux-labs.com/ns/bject: Incoming_SMS from \$(CALLERID(num)) \n\n\$(STRFITME(\$( 20 exten =&gt;</pre>		

#### 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

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	+ Ade	d Trunk +							Search				-
	Name		0 1	fech		CallerID		Status		Actions			
	Sample	-GSM-3G-SIM_Trunk_	Dongle0 d	custom				Enabled		6			
	Teli_SIP	Trunk-15705636566	5	sip				Enabled		8			
	MyRep	ublic_SIPTrunk-67174	885 s	iip				Enabled		80			
	Sample	-SIP.US_Trunk	s	ip				Disabled		6			
	Showing	1 to 4 of 4 rows											
				*	★ Free	PBX	FreePBN is a registered trademark of Sangoma Technologies Inc. FreePBX 13.0.195 is licensed under the GPL	Crux Labs					

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

R	reePBX Adm	inistration ×										θ	-	σ	
	C O	crux-b/admin/config.php	?display=1	trunks									Ŷ		
'	Admin Trunk	Applications Cor	nectivity	Dashboard	Reports	Settings UCP								۹	
	This p	age is used to manage va	rious syst	em trunks											
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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

	display:	-trunks						÷ 1	,
dmin Applications Cor	nectivit	v Dashboard Reports	Settings UCP						c
Trunks									
This page is used to manage va	rious sys	item trunks							
+ Add Trunk +					Search				
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Sample-SIP.US_Trunk		sip		Disabled		8 🖬		☆ ¥ (C	
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- 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)

Admin A	pplications	Connectivity	Dashboard	Repor	ts	Settings	UCP								Q
Edit Tru	nk														
In use by 1	route														+
General	Dialed Nun	nber Manipulation	n Rules	custom Set	tings										
Trunk Nam	e 0		83034332												
Hide Caller	ID 😡		Yes	No											
Outbound (	CallerID 😧		<8303433	2>											
CID Options	5 😧		Allow A	ny CID	Block	Foreign CIDs	Remo	ve CNAM	Force Tru	nk CID					
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Asterisk Tru	unk Dial Option	s 😧	Tt Overrid	e Syste	m										
Continue if	Busy 😧		Yes	No											
Disable Tru	nk Ø		Yes	No											
											» Sub	omit	Duplicate	Reset	D

*h)* On the Dialled 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 dialled.* 

10	<ul> <li>FreePBX Administra</li> </ul>	tion ×									1	-	σ		×
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	General	Dialed Number Manipulation Rules	custom settings												1
	Dial Numb	er Manipulation Rules													ı
	These rules ca	n manipulate the dialed number before sen	ding it out this trunk. I	f no rule ap	plies, the	e number is no	ot changed. The o	original dia	led number	is passed do	wn from the ro	ute w	here		ı
	some manipu pattern boxe	lation may have already occurred. This trunk s, the rule will be applied and all subsequent	has the option to furt rules ignored.	ther manipu	late the	number. If the	e number matche	es the com	bined value	s in the <b>prefi</b>	c plus the mat	ch			ı
	Upon a match	, the <b>prefix</b> , if defined, will be stripped. Next	the <b>prepend</b> will be in	nserted in fr	ont of th	e match patt	t <b>ern</b> and the resu	Iting num	ber will be s	ent to the tru	nk. All fields ar	e			
	Bulan														ı
	X matches a	ny digit from 0-9													ı
	Z matches ar N matches a	iy digit from 1-9 ny digit from 2-9													ı
	[1237-9] matc . wildcard, m	hes any digit or letter in the brackets (in this atches one or more characters (not allowed	example, 1,2,3,7,8,9) before a   or +)												ı
				12 20 1											L
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	Gatbound D														•

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.

😇 FreePBX Administration 🗙		≜ – Ø
	ay=OUT_1	🛧 💹 🛒 🐾
Admin Applications Connectivity Dashboard Repo	rts Settings UCP	Q
Edit Trunk		
In use by 1 route		+
General Dialed Number Manipulation Rules custom Set	ttings	(
Custom Dial String 📀 dongle/dongle0/\$OU	TNUM\$	
	> Submit Duplicate	Reset Delet
FreePB2 let freedom ring	Tree BEC is a registered tractemark of Sagema Technologies Inc. Free BECI 31215 15 is listered under the GR. Copyright 2007-2017	

- 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 trustrpid=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

 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.

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	fromdomain= <ip domain="" or=""></ip>					- 1
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℃ free#EX.dominatorion ×		Outgoing tab	ס		θ	- (
C° freeFBX Administration ×	p?display=trunks@tech=sip&extdisplay=CUT_44	Outgoing tak	)		θ	- ( <u> </u> <u> </u>
C* FreeFEX Administration × C (D) Not secure crue kr/admin/config.phg Admin Applications Connectivity	p?display=trunks&tech=sip&mddisplay=CUT_44 Dashboard Reports Settings	Outgoing tak	)		θ	- (
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Incoming tab

#### **Set Outbound Routes**

- a) Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- b) Select Connectivity -> Outbound Routes to add an Outbound route using this trunk.
- c) Refer screens below with blue boxes as indictors 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.
- d) Match same dialplan previously added, in "dial patterns" tab here.
- e) Click the small "?" next to each option to get quick help on what that option does.





Step 2

f) Select Submit, followed by Apply Config.

#### **Set Inbound Routes**

- a) Login as Admin into the FreePBX portal (Refer Accessing Crux LX Admin portals)
- *b)* Select Connectivity -> Incoming Routes and add an inbound route as follows.
- c) 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.* 

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Connectivity	Dashboard	Reports	Settings	UCP							Q	4
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d) Select Submit, followed by Apply Config.

How to check Registration Status of SIP Trunks

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

Chan_Sip Info	)							Summary	- A
Chan_Sip Char	nel(s)							Registries	
								Channels	
Peer	User/ANR	Call ID F	ormat	Hold	Last Message	Expiry	Peer	Peers	
198.27.68.108 213.32.111.227 105.154.00.147	1008	2038819849-8097 ( f249cd1d9eb3cdf (	nothing) nothing)	No	Rx: INVITE Rx: INVITE		<guest></guest>	Chan_Sip Info	
195.154.90.147 198.27.68.108	1008	1/2162/584-2006 ( 1981776405-1542 (	nothing) nothing)	No	Rx: INVITE Rx: INVITE		<pre><guest> <guest></guest></guest></pre>	IAX Info	
192.168.0.1 216.244.85.2 198.27.68.108	(none) 2222 1008	ce8b2badd61d9dd (	nothing)	No	Rx: INVITE		<guest></guest>	Conferences	
198.27.68.108	1008	207302093-26519 (	nothing)	No	Rx: INVITE Rx: INVITE		<guest></guest>	Subscriptions	
9 active SIP d	ialogs	000071014 10710 (	in childer				(Boche)	Voicemail Users	
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Chap Sin Boor									

## **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

	figedit	☆ ♥ 🛄
Admin Applications Connectivity Dashboa	rd Reports Settings UCP	Q
Configuration File Editor		
What is Configuration File Editor		
+ Add New File	Working on sip_vpn_hook_custom.conf	
res_toux_custom.conf     res_touxion.conf     res_touxion.conf	1 # To be enabled if a 1-1 or VPN-based SIP trunk is being added over eth1 - for example Singtel 2 # Sample mir route add XX,XX,X213 pm YY,YY,YY,S7 metric 1 dev eth1 3 #route add <-net if .0 neturok being addeds. SCP server IP on VPN or 1-15 pw (gateway server IP 5 route add -net 202.163.63.0/24 pw 198.18.184.57 metric 1 dev eth1 6 route add -net 198.18.184.0/30 pw 198.18.184.57 metric 1 dev eth1	or other dedicated SI
Con Asterisk System Configuration Files		
- 🖻 acLconf	4	•
- 🔄 agents.conf		Cause Delete
- III alsa.conf		Save
B and.cont		
additional.conf		
	*	

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.

C O Not secure   crux-lx/admin/config.php?dis	isplay=sipsettings	\$	• 13	٢
Admin Applications Connectivity D	Dashboard Reports Settings UCP		Q	٥
Default TLS Port Assignment 🛛	Chan SIP PJSip			
-NAT Settings				
These settings apply to both chan_sip and cha	an_pjsip.			
External Address 😧	59.189.9.248			
	Detect Network Settings			
Local Networks 😡	192.168.45.0 / 24			
	192.168.0.0 / 24			
	SIP Network / 24			
	Gateway Network / 30			
	Add Local Network Field			
-RTP Settings				
RTP Port Ranges 😖	Start: 15400			
	End: 15500			
RTP Checksums 😧	Yes No			
Strict RTP 💿	Yes No			
STUN Server Address 📀		» Submit	Re	iset

- 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

← → C O Not secure   crux-lx/	/router-gui/index.php?page=ifconfig_conf	🕁 🌳 🗷 🙂
Crux LX WiFi Portal		
2 Dashboard		
Setup AccessPoint	C Advanced Network Config	
	CAUTION: For Network Admins ONLY. Change with extreme care as changes made will be irreversible & may lock you out of Crux LX.	×
al Setup Wireless Client		
al Setup 3G Dongle	Edits /etc/network/interfaces to configure network interfaces. Use Roliback button to undo previous unapplied Commit.	X
Advanced NW Config		
SIP Security Config	auto lo fiface lo inet loopback	
Change Password	# eth0 Dynamic IP	
System	auto eth0 I <u>face eth0 inet</u> manual	
	# eth1 Static IP - Loopback SIP server configuration	
	auto ettini iface ettini inet static	
	address Frivate IP netmask 255,255,255,252	
	gateway sateway in*	
	Commit changes Reset Rollback	
	Powered by RaspAP WebGUI	

- 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.

Daebhoard		
Catholard	System	
Setup AccessPoint		
Configure DHCP	System Information	Root File System Information
Setup Wireless Client	Model Crux LX v1.0 GR4 Serial No. 00000002e49b600	Allocated Space 15 GB Unallocated Space 0 GB
Setup 3G Dongle	Ethernet0 MAC / IP b8:27:eb:49:b6:00 / 192.168.0.45 Ethernet1 MAC / IP xxxxxxxxxxxx / Private IP	Can increase? No
Advanced NW Config	Hostname crux-ix HW Revision PI 3 Model B	For use with upto 32GB memory only. This action is irreversible. Requires reboot.
SIP Security Config	Uptime 17 days 4 hours 16 minutes	
Change Password	Storage (15 GB) 4GB	
System	Memory Used 33%	
	CPU Load	
	Temperature 60°C	
	Reboot Shutdown Refresh	
	Powered by RaspAP WebGUI	

#### 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.

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

Admin Applications	Connectivity	Dashboard	Reports	Settings	UCP				Q
	System Overv	view		Advanced	f Settings	FreePBX Statistic	cs	C	
v	Velcome to Fre	eePBX		Asterisk L	ogfile Settings	🕽 Users Offlin 🧧 Trunks	s Reg 🕚 Trunks Offli 🔍 Active	Call 100	
FreePBX 13.0. (You can cl	195.4 <b>'Crux LX Sma</b> nange this name in A	ert Router Platforr Advanced Settings)	'n	Asterisk M Asterisk F	Manager Users REST Interface Users			80	
Summary	1	SysInfo updated 2 :	seconds ago	Asterisk S	IP Settings			60	
Asterisk		System Ale	erts	Extension	n Settings			40	
WybQL Web Server	-	No critical issue	es found	Fax Confi Music on	guration Hold			20	
	Show New			PHPAGI C PIN Sets	ionfig	Uptime			
				QueueMe Route Co Text To Sp Voicemail	etrics ngestion Messages peech Engines I Admin	System Last Reboote	ed 8 seconds. ago		
					0.04 7 Minute	0.03 5 Minutes	0.00 15 Minutes		

c) Click "Detect Network Settings"

min Applications Connectivity	Dashboard Reports Settings UCP	Q
IP Settings		
O SIP driver information		+
General SIP Settings Chan SIP S	Settings	
-Security Settings		
Allow Anonymous Inbound SIP Calls 🥹	Yes No	
Default TLS Port Assignment 🥹	Chan SIP PJSip	
-NAT Settings		
These settings apply to both chan_sip a	nd chan_pjsip.	
These settings apply to both chan_sip a	nd chan_pjsjp.	
These settings apply to both chan_sip a	nd chan_pjsjp. 59.189.9.248	
These settings apply to both chan_sip a	nd chan_pjsip. 59.189.9.248 Detect Network Settings	
These settings apply to both chan_sip a External Address	192.168.45.0 / 24	
These settings apply to both chan_sip a External Address  Cocal Networks	nd chan_pisip. 59.189.9.248 Detect Network Settings 192.168.45.0 / 24	
These settings apply to both chan_sip a External Address  Cocal Networks	nd chan_pipip. 59.189.9.248 Detect Network Settings 192.168.45.0 / 24 192.168.0.0 / 24	
These settings apply to both chan_sip a External Address  Cocal Networks	nd chan_pipip. 59.189.9.248 Detect Network Settings 192.168.45.0 / 24 192.168.0.0 / 24 Add Local Network Field	
These settings apply to both chan_sip a External Address  Cocal Networks  Cocad Networks  Cocal Networks  Cocal Networks  Coca	nd chan_pipip. 59.189.9.248 Detect Network Settings 192.168.45.0 / 24 192.168.0.0 / 24 Add Local Network Field	
These settings apply to both chan_sip a External Address  Cocal Networks  Cocal Networks  RTP Settings RTP Port Ranges	nd chan_pipip. 59.189.9.248 Detect Network Settings 192.168.45.0 / 24 192.168.0.0 / 24 Add Local Network Field Start: 15400	
These settings apply to both chan_sip a External Address  Cocal Networks  Cocal Networks  RTP Port Ranges  Cocal Settings	nd chan_pipip. 59.189.9.248 Detect Network Settings 192.168.45.0 / 24 192.168.0.0 / 24 Add Local Network Field Start: 15400 End: 15500	

d) 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)

- a) 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.
- b) Login as Admin into the WiFi portal (Refer Accessing Crux LX Admin portals)



Dashboard

- c) Click "Setup 3G Dongle" tab from the menu on the left
- d) 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.)

C O crux-bx/router-gui/	index.php?page=ppp0_info		Ϋ́,		
Crux LX WiFi Portal					
Dashboard	B. Carlow Dente				
Setup AccessPoint					
Configure DHCP	Dongle Data is OFF			х	
Setup Wireless Client					
al Setup 3G Dongle	Interface Information	Find the Dongle IMEI / IMSI Numbers			
Advanced NW Config	Interface Name ppp0	Dongle # 0 IMEI of Dongle [0] 353558046864906			
SIP Security Config	Subnet Mask	Initial of anit [0] 626010137334630			
Change Password	Interface Statistics	INFO - Use the correct dongle number if multiple dongles are being used.			
) System	Received Packets Received Bytes				
	Transferred Packets Transferred Bytes	Retrieve			
	INFO - Dongle start/stop can take upto a minute. Refresh once the page is loaded.				
	Start Dongle Service Refresh				
	Powered by RaspAP WebGUI				

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.

Concursion of purpose page sequences of the sequence of t	FreePBX Administration × C C	Aux LX WHF Configurate: *	0 - a
Bushbard     Schup AccessPoint     Configure Dongle     Configure     Configure Dongle     Configure     Conf	Crux LX WiFi Portal	aerbub:baßs=bbbr/uso	H I I
	B Dashboard		
	Setup AccessPoint	as Configure Dongie	
Image: Status	# Configure DHCP	Dongle Data is ON	х
Image: Status 30 Dongle       Interface Information         Markanood NV Config       Markanood NV Config         Markanood NV Config       Markanood NV Con	al Setup Wireless Client		
Advanced NW Config     NFO - Dongle Startistop can take upto a minute. Refresh once the page is loaded.     Isop Dongle Startistop can take upto a minute. Refresh once the page is loaded.     Isop Dongle Startistop Config     Advanced NW Config     NFO - Dongle Startistop can take upto a minute. Refresh once the page is loaded.     Isop Dongle Startistop     Advanced NW Config	al Setup 3G Dongle	Interface Information	Find the Dongle IMEI / IMSI Numbers
A SIP Society Config     A Charge Password     Config     A Charge Password     C	C Advanced NW Config	Interface Name ppp0 IP Address 10.226 (40.192	Dongle # 0 IMEI of Dongle (0) 353558046864906
Change Password  Change Password  Change Password  Interface Statistics	SIP Security Config	Subnet Mask 255.255.255	INIGI OF BIM [U] 02001010100000
	Change Password	Interface Statistics Received Parkets 7	INFO - Use the correct dongle number If multiple dongles are being used.
Transferred Packets 8 Transferred Bytes NFO - Dongle startistop can take upto a minute. Refresh once the page is loaded. Eliop Dongle Service Refresh Powerd by RaspAP WebGUI	System	Received Bytes	
INFO - Dongle start/stop can take upto a minute. Refresh once the page is loaded.  Stop Dongle Service Refresh Powerd by RaspAP WebGUI		Transferred Packets 8 Transferred Bytes	Retneve
Stop Dorgie Bervice Rafresh Powered by RaspAP WebGUI		INFO - Dongle start/stop can take upto a minute. Refresh once the page is loaded.	
Powered by RaspAP WebGUI		Stop Dongle Service Refresh	
		Powered by RaspAP WebGUI	
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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.

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

Setup Wireless Client	SSID	Channel	Security	Passphrase		
Setup 3G Dongle	NossyFossyHomeLo	1	WPA (CCMP+TKIP) WPA2 (CCMP+TKIP)		Add	Delete
Advanced NW Config	ASUS9654	6	WPA2 (CCMP)		Add	Delete
Change Password	B129	1	WPA (CCMP) WPA2 (CCMP)		Add	Delete
	SINGTEL-1574	8	WPA2 (CCMP)		Add	Delete
	SINGTEL-220F	8	WPA (CCMP+TKIP) WPA2 (CCMP+TKIP)		Add	Delete
	PROLINK_15FAE0	4	WPA2 (CCMP)		Add	Delete
	dlink-AB1C_EXT	11	WPA (CCMP+TKIP) WPA2 (CCMP+TKIP)		Add	Delete
	SINGTEL-0089	3	WPA (CCMP+TKIP) WPA2 (CCMP+TKIP)		Add	Delete
	OjuOmu	11	WPA (CCMP+TKIP) WPA2 (CCMP+TKIP)		Add	Delete
	SINGTEL-A602	1	WPA2 (CCMP)	wifipassword	Add	Delete
	Disconnect Wireless Client	Refresh				

## **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

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

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← → C O crux-bx/router-gui/	ndex.php?page=system_info	± ¥ 10
Crux LX WiFi Portal		
n Dashboard	D Dorston	
Setup AccessPoint	C System	
# Configure DHCP	System Information	Root File System Information
al Setup Wireless Client	Model Crux LX v1.0 GR4	Allocated Space 15 GB
al Setup 3G Dongle	Ethernet0 MAC / IP b8:27:eb:49:b6:00 / 192.168.0.45	Can increase? No
Advanced NW Config	Hostname crux-lx HVX Revision PI 3 Model B	For use with upto 32GB memory only. This action is irreversible. Requires reboot.
SIP Security Config	Uptime 4 minutes	
Change Password	Storage (15 GB) 408	
🗑 System	Memory Used 21%	
	CPU Load 12%	
	Temperature	
	Reboot Shutdown Refresh	
	Powered by RaspAP WebGUI	

#### **Default SSID & Password for Crux LX**

- a) Default SSID: CRUX-LX-WiFi-SSID
- b) Default Password: cruxwifi

#### **Changing Default SSID & Password for Crux LX**

- a) These can be changed at <u>http://192.168.45.1/</u> or <u>http://crux-lx/</u>
- b) Select WiFi Portal
- c) Click Setup AcessPoint 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**

- a) Default login: admin
- b) Default password: admin

#### **Default login to FreePBX Portal**

- a) Default login: admin
- b) Default password: admin

#### Default Password for pre-configured extensions 200-299

a) Default password: crux1234

Crux LX WiFi Configuratic ×		<b>- -</b>
Crux LX WiFi Portal	ndex.php?page=hostapd_conf	x 🛛 🔻 🕷
Dashboard     Setup AccessPoint	O Configure Wireless AccessPoint (AP)	
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all Setup 3G Dongle	Basic Security Advanced	
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## 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 internetworked 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 - <u>https://goo.gl/forms/2VEDEOAZZdhRELXu1</u>

#### 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 <u>http://www.crux-labs.com/</u> or drop a line to <u>info@crux-labs.com</u> 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 - <u>https://goo.gl/forms/2VEDEOAZZdhRELXu1</u>

# 9. Troubleshooting