

# Revolutionary: Incredible PBX & Fax 2020 for Raspberry Pi

[nerdvittles.com/1-minute-wonder-incredible-pbx-fax-2020-for-raspberry-pi](https://nerdvittles.com/1-minute-wonder-incredible-pbx-fax-2020-for-raspberry-pi)



Enhancements to the Raspberry Pi 4 platform have been fast and furious this fall. Last week we introduced a [\\$45 bootable SSD](#) for the Raspberry Pi. And this week we're showcasing the [\\$70 Raspberry Pi 400 keyboard PC](#) and a new release of the [Incredible PBX 2020](#) image supporting both of these additions with all the latest Raspberry Pi firmware.

As we're all hunkered down hiding from the Coronavirus, it seemed a perfect time to finally tackle the project we've been putting off for longer than we care to publish, integrating Incredible Fax with HylaFax and Avantfax into the base image of Incredible PBX® 2020 on the Raspberry Pi 4 platform. This build also features Asterisk® 16 with the latest FreePBX® 15 GPL modules plus the feature sets of [Incredible PBX®](#) and [RasPBX](#) and [RonR's latest build](#). It includes support for plug-and-play Incredible IP Phones and a new trunking platform that integrates SMS messaging into your Asterisk platform. And it's all rolled into one terrific bundle that can be installed in about a minute after you burn the image to a microSD card.

Unlike other aggregations, there's nothing to compile with Incredible PBX/FAX 2020 for Raspbian 10. And, unlike the FreePBX Distro, we don't rely on static packages which make it difficult to add future modifications on your own. Instead, Incredible PBX/Fax 2020 offers a snapshot image with a complete toolkit to make future modifications as desired. Last, but not least, Incredible PBX/Fax 2020 features the new ClearlyIP module repository which protects you from [proprietary modifications](#) that limit or cripple your PBX moving forward.

**What's Included?** Incredible PBX/Fax 2020 for Raspbian 10 serves up a never before available VoIP powerhouse featuring Asterisk 16 and all FreePBX 15 GPL modules, an Apache web server, the latest MariaDB SQL server (formerly MySQL), Exim4 mail server, Incredible Fax with turnkey Hylafax and AvantFax, and most of the Incredible PBX feature set including SIP, SMS, voice recognition, AsteriDex, PicoTTS Text-to-Speech VoIP applications plus email delivery of faxes in PDF format, Click-to-Dial, News, Weather, Telephone Reminders, and hundreds of features that typically are found in commercial PBXs: Conferencing, IVRs and AutoAttendants, Email Delivery of transcribed voicemails, Voicemail Blasting, and more. We've also incorporated the Zero Trunk Configuration feature from the LITE build which lets you sign up with one of four VoIP providers and start making and receiving calls instantly. Or you can use the new ClearlyIP trunking module included in the GUI for seamless integration of SMS messaging into FreePBX and its User Control Panel.

**Choosing a SIP Provider.** As we mentioned, Incredible PBX/Fax 2020 comes preconfigured to support five of the major SIP providers: ClearlyIP, Skyetel, VoIP.ms, V1VoIP, and Anveo Direct. We obviously hope you'll choose ClearlyIP, Skyetel, or VoIP.ms trunking because they financially support Nerd Vittles and our open source projects. As the old saying goes, they may not be the cheapest, but you get what you pay for. With all five providers, you only pay for minutes you use so signing up with more than one provider is a smart idea.



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## Assembling the Required Raspberry Pi Components

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Before you can deploy Incredible PBX 2020, you'll first need the necessary Raspberry Pi hardware. To support the enhanced Incredible PBX/Fax platform, we strongly recommend either the Raspberry Pi 400 or the Raspberry Pi 4B with at least 2GB RAM for under \$42.

You can choose a reseller below for quicker delivery. Assuming you already own an HDMI-compatible monitor and a USB keyboard (only required if you don't buy a RasPi 400)...

- [Raspberry Pi 4B](#) or [Raspberry Pi 400](#)
- [\\$8 USB-C RasPi 4 \(only\) Power Supply](#).
- [\\$8 32GB microSDHC Class 10 card \(strongly recommended!\)](#).
- [\\$5 Official RasPi 4B Case](#) or see above for our favorite

## Getting Started with Incredible PBX 2020

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Here's our 10-Step Guide to installation and setup. "Automatic" means just watch. Steps #1 and #2: follow the links. For the remaining steps, we'll further document the procedures.

1. [Download and unzip latest Incredible PBX/FAX 2020.3 image from SourceForge](#)
2. [Transfer Incredible PBX/FAX 2020 image to microSD card](#) and Boot server
3. Login to RasPi console as root:password to initialize your server (Automatic)
4. In *Localization Options*, set *Locale*, *TimeZone*, *Keyboard*, & *WiFi Country*
5. Reboot *after* writing down your server IP address (Automatic)
6. Login via SSH or Putty as root:password to set passwords & setup firewall (Automatic)
7. Enter an email address for receipt of incoming faxes in PDF format
8. Run *admin-pw-change* to set the admin password for access to the web GUI
9. Register for and configure at least one trunk provider for Incredible PBX 2020
10. Set up and test your Exim mail server as documented below

## First Boot of Incredible PBX 2020 with Wi-Fi

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Incredible PBX 2020 requires Internet connectivity to complete its automated install. If you're using a wired network connection, you can skip to the next section. With the Raspberry Pi 3B, 4B and 400, WiFi is built into the hardware. But you still have to insert your SSID name and SSID password to make a connection to your WiFi network. To do so, follow these next steps carefully. Insert the Incredible PBX 2020 microSD card into your Raspberry Pi and apply power to the hardware. When the bootup procedure finishes, login as root with the default password: password. At the first prompt, DO NOT PRESS THE ENTER KEY! Instead, press Ctrl-C to break out of the setup script. At the command prompt, issue the following commands to bring up the WiFi config file:

```
cd /etc/wpa_supplicant
nano -w wpa_supplicant.conf
```

If your WiFi network does not require a password, uncomment or insert the four lines below and save the file: *Ctrl-X, Y, then Enter*. Now restart your server: *reboot*. When the reboot finishes, you now should have network connectivity.

```
network={
  key_mgmt=NONE
  priority=1
  country=US
}
```

If your WiFi network requires a password, uncomment or insert the following into `wpa_supplicant.conf`:

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=US
```

```
network={
  ssid="YourSSID"
  psk="YourSSIDpassword"
  key_mgmt=WPA-PSK
  scan_ssid=1
  priority=7
}
```

Then scroll down to the **SSID** entry and replace *YourSSID* with the actual SSID of your WiFi network. Make sure you preserve the entry with the quotes as shown. Next, replace *YourSSIDpassword* with the SSID password of your WiFi network. Save the file: *Ctrl-X, Y, then Enter*. Now restart your server: *reboot*. When the reboot finishes, you now should have network connectivity.

Once the reboot process finishes, you should see an entry on about the middle line displayed on your monitor which reads: "My IP address is...". Write down the IP address shown. You'll need it in a minute. Skip the next section since you are using a WiFi connection.

If you don't see an IP address assigned to your server, then correct the network deficiency (invalid WiFi credentials, DHCP not working, Internet down), and reboot until you see an IP address assigned to your server. **DO NOT PROCEED WITHOUT AN ASSIGNED IP ADDRESS.** NOTE: The Raspberry Pi 400 requires the latest Incredible PBX image for Wi-Fi connectivity.

You'll also need to change the default PortKnocker setting to your wireless LAN connection:

```
sed -i 's|eth0|wlan0|' /etc/default/knockd
service knockd restart
```

## First Boot of Incredible PBX Using Wired Connection

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Incredible PBX 2020 requires Internet connectivity to complete its automated install. After connecting your server to your local network with a network cable, insert the Incredible PBX 2020 microSD card into your Raspberry Pi and apply power to the hardware. When the

bootup procedure finishes, you should see an entry on about the middle line displayed on your monitor which reads: "My IP address is...". Write down the IP address shown. You'll need it in the next step.

If you don't see an IP address assigned to your server, then correct the network deficiency (cable not connected, DHCP not working, Internet down), and reboot until you see an IP address assigned to your server. **DO NOT PROCEED WITHOUT AN ASSIGNED IP ADDRESS.**

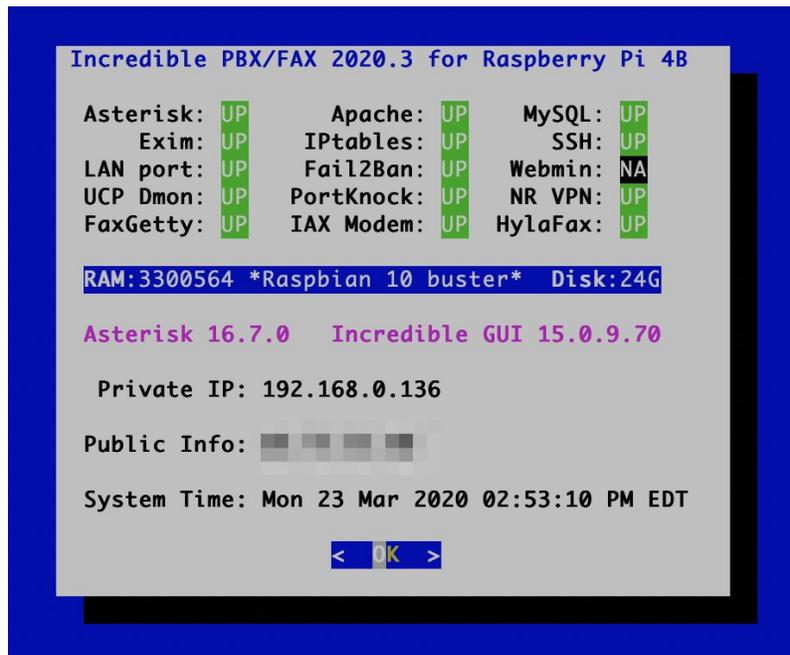
## Completing the Incredible PBX Initialization Procedure

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Unless your desktop PC and RasPi are both on the same private LAN, the remainder of the install procedure should be completed from a desktop PC using SSH or Putty. This will assure that your desktop PC is also whitelisted in the Incredible PBX firewall. Using the console to complete the install is NOT recommended as your desktop PC will not be whitelisted in the firewall. This may result in your not being able to log in to your server. Once you have network connectivity, log in to your server as root from a desktop PC using the default password: password. Accept the license agreement by pressing ENTER. You then will be redirected to *raspi-config*. This is the utility used to expand your Incredible PBX 2020 image to use your entire microSD card; however, this new build does this for you so you can skip this step. Next, choose **Localization Options** and set *Locale*, *TimeZone*, *Keyboard*, & *WiFi Country*. Review the other items and then exit and reboot.

Once your server reboots and you log back in as root, you'll first be prompted to enter an email address for delivery of incoming faxes in PDF format. All of your passwords then will be randomly assigned with the exception of the root user Linux password and your admin passwords for access to the web GUI and AvantFax. You can set the root password by issuing the command: `passwd` . Set the admin password for access to the web GUI with this command: `/root/admin-pw-change` . Set the admin password for access to AvantFax with this command: `/root/avantfax-pw-change` . With the exception of these passwords, the remaining passwords can be displayed using the command: `/root/show-passwords` .

Finally, if your PBX is sitting behind a NAT-based router, you'll need to redirect incoming UDP 5060-5061 and UDP 10000-20000 traffic to the private IP address of your RasPi. This is required for all of the SIP providers included in the Incredible PBX 2020 build. Otherwise, all inbound calls will fail.



## Configuring Skyetel for Incredible PBX 2020

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If you've decided to go with Skyetel, here's the drill. Sign up for Skyetel service and take advantage of the [Nerd Vittles Free \\$10 credit and BOGO special](#). First, [complete the Prequalification Form here](#). You then will be provided a link to the Skyetel site to complete your registration. Once you have registered on the Skyetel site and your account has been activated, open a support ticket and request the \$10 credit for your account by referencing the [Nerd Vittles special offer](#). Once you are happy with the service, open another ticket after funding your account and request that Skyetel match your deposit of up to \$250. That gets you up to \$500 of half-price calling. Credit is limited to one per person/company/address/location. If you have numbers to port in, you can do it at no cost after funding your account.

Skyetel does not use SIP registrations to make connections to your PBX. Instead, Skyetel utilizes **Endpoint Groups** to identify which servers can communicate with the Skyetel service. An Endpoint Group consists of a Name, an IP address, a UDP or TCP port for the connection, and a numerical Priority for the group. For incoming calls destined to your PBX, DIDs are associated with an Endpoint Group to route the calls to your PBX. For outgoing calls from your PBX, a matching Endpoint Group is required to authorize outbound calls through the Skyetel network. Thus, the first step in configuring the Skyetel side for use with your PBX is to set up an Endpoint Group. Here's a typical setup for Incredible PBX 2020:

- **Name:** MyPBX
- **Priority:** 1
- **IP Address:** PBX-Public-IP-Address
- **Port:** 5060
- **Protocol:** UDP

- **Description:** 2020.incrediblepbx.com

To receive incoming PSTN calls, you'll need at least one DID. On the Skyetel site, you acquire DIDs under the **Phone Numbers** tab. You have the option of **Porting in Existing Numbers** (free for the first 60 days after you fund your account) or purchasing new ones under the **Buy Phone Numbers** menu option.

Once you have acquired one or more DIDs, navigate to the **Local Numbers** or **Toll Free Numbers** tab and specify the desired **SIP Format** and **Endpoint Group** for each DID. Add **SMS/MMS** and **E911** support, if desired. **Call Forwarding** and **Failover** are also supported. That completes the VoIP setup on the Skyetel side. System Status is always available [here](#).

## Configuring VoIP.ms for Incredible PBX 2020

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To sign up for VoIP.ms service, may we suggest you [use our signup link](#) so that Nerd Vittles gets a referral credit for your signup. Once your account is set up, you'll need to set up a SIP SubAccount and, for Authentication Type, choose Static IP Authentication and enter your Incredible PBX 2020 server's public IP address. For Transport, choose UDP. For Device Type, choose Asterisk, IP PBX, Gateway or VoIP Switch. Order a DID in their web panel, and then point the DID to the SubAccount you just created. Be sure to specify **atlanta1.voip.ms** as the POP from which to receive incoming calls. On the Incredible PBX side, simply Enable the VoIPms trunk and save your update.

## Configuring V1VoIP for Incredible PBX 2020

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To sign up for V1VoIP service, [sign up on their web site](#). Then login to your account and order a DID under the DIDs tab. Once the DID has been assigned, choose View DIDs and click on the Forwarding button beside your DID. For Option #1, choose Forward to IP Address/PBX. For the Forwarding Address, enter the public IP address of your server. For the T/O (timeout) value, set it to 20 seconds. Then click the Update button. Under the Termination tab, create a new Endpoint with the public IP address of your server so that you can place outbound calls through V1VoIP. On the Incredible PBX side, simply Enable the V1VoIP trunks and save your updates.

## Configuring Anveo Direct for Incredible PBX 2020

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To sign up for Anveo Direct service, [sign up on their web site](#) and then login. After adding funds to your account, purchase a DID under Inbound Service -> Order DID. Next, choose Configure Destination SIP Trunk. Give the Trunk a name. For the Primary SIP URI, enter `[$[E164]]$@server-IP-address`. For Call Options, select your new DID from the list. You also must whitelist your public IP address under Outbound Service -> Configure. Create a new Call Termination Trunk and name it to match your server. For Dialing Prefix, choose six alphanumeric characters beginning with a zero. In Authorized IP Addresses, enter the public

IP address of your server. Set an appropriate rate cap. We like \$0.01 per minute to be safe. Set a concurrent calls limit. We like 2. For the Call Routing Method, choose Least Cost unless you're feeling extravagant. For Routes/Carriers, choose Standard Routes. Write down your Dialing Prefix and then click the Save button. On the Incredible PBX side, simply Enable the AnveoDirect trunks and save your updates.

Before you can make outbound calls through Anveo Direct from your PBX, you first must configure the Dialing Prefix that you wrote down in the previous step. Using a browser, login to the GUI as admin. Navigate to *Connectivity -> Trunks -> Anveo-Out*. Click the *Pencil* icon to edit the trunk settings. Then click the Custom Settings tab. Replace *anveo-pin* with your actual Anveo PIN. Click *Submit* and *Apply Settings* to save your changes.

By default, incoming Anveo Direct calls will be processed by the Default inbound route on your PBX. If you wish to redirect incoming Anveo Direct calls using DID-specific inbound routes, then you've got a bit more work to do. In addition to creating the inbound route using the 11-digit Anveo Direct DID, enter the following commands after logging into your server as root using SSH/Putty:

```
cd /etc/asterisk
echo "[from-anveo]" >> extensions_custom.conf
echo "exten => _.,1,Ringing" >> extensions_custom.conf
echo "exten => _.,n,Goto(from-trunk,\\${SIP_HEADER(X-anveo-e164)},1)" >>
extensions_custom.conf
asterisk -rx "dialplan reload"
```

## Adding a Bootable SSD to Raspberry Pi

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Shown below are the two components that make up the 256GB storage solution for the Raspberry Pi. These include the M.2 SSD SATA drive and the M.2 enclosure which provides a USB connector that's compatible with your RasPi. Assembly of the components takes less than a minute as shown in the steps below:

## Tool-free Installation



You can order the [M.2 SSD SATA drive](#) and the [UGREEN M.2 enclosure](#) using our Amazon referral links which help support Nerd Vittles and the Incredible PBX open source project. Once you have assembled your SSD in the sleeve, log back in as root using SSH or Putty. For best performance, insert the SSD drive into one of the blue USB 3.0 ports and verify that `/dev/sda` device is shown when you issue the command: `fdisk -l`

Now proceed with the following steps to copy the image from your microSD card to the new SSD SATA drive:

```
rpi-clone -l -e sda -f sda
# answer prompts with yes and incred2020
# once the image is copied, dismount the drive when prompted
mount /dev/sda2 /mnt/clone
cd /mnt/clone/boot
cp -p -r /boot/* .
sed -i 's|sda2|mmcblk0p2|' /boot/cmdline.txt
cd /
umount /mnt/clone
halt
```

Now you're ready to restart your Raspberry Pi from the SSD SATA drive. Remove the microSD card and reboot your server.



## Configuring a Softphone for Incredible PBX 2020

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We're in the home stretch now. You can connect virtually any kind of telephone to your new PBX. Plain Old Phones require an analog telephone adapter (ATA) which can be a separate board in your computer from a company such as Digium. Or it can be a standalone SIP device such as ObiHai's OBi100 or OBi110 (if you have a phone line from Ma Bell to hook up as well). SIP phones can be connected directly so long as they have an IP address. These could be hardware devices or software devices such as the YateClient softphone. We'll start with a free one today so you can begin making calls. You can find dozens of recommendations for hardware-based SIP phones both on Nerd Vittles and the PIAF Forum when you're ready to get serious about VoIP telephony.

We recommend YateClient which is free. [Download it from here](#). Run YateClient once you've installed it and enter the credentials for the 701 extension on Incredible PBX. You can find them by running `/root/show-passwords`. You'll need the IP address of your server plus your extension 701 password. In the YateClient, fill in the blanks using the IP address of your **Server**, 701 for your **Username**, and whatever **Password** was assigned to the extension when you installed Incredible PBX. Click OK to save your entries.

Use provider:	-none-	▼	Domain:	<input type="text"/>
Protocol:	sip	▼	Outbound proxy:	<input type="text"/>
Username:	6002			
Password:	*****			
Save password:	<input checked="" type="checkbox"/>			
Server:	ip-address-goes-here			
	Advanced >>			Registration Interval:
				<input type="text"/>
	Authentication username:	Transport:		
	<input type="text"/>	UDP	▼	
✓ Ok		✗ Cancel		?

Once you are registered to extension 701, close the Account window. Then click on YATE's Telephony Tab and place some test calls to the numerous apps that are preconfigured on Incredible PBX. Dial a few of these to get started:

DEMO - Apps Demo  
 123 - Reminders  
 947 - Weather by ZIP Code  
 951 - Yahoo News  
 TODAY - Today in History  
 LENNY - The Telemarketer's Worst Nightmare

If you are a Mac user, another great no-frills softphone is [Telephone](#). Just download and install it from the [Mac App Store](#).

## Audio Issues with Incredible PBX 2020

Only if you experience one-way or no audio on some calls, add your external IP address and LAN subnet in the GUI by navigating to *Settings -> Asterisk SIP Settings*. In the *NAT Settings* section, click *Detect Network Settings*. Click *Submit* and *Apply Settings* to save your changes.

## Configuring Gmail as Exim Smart Relay Host

Most Raspberry Pi implementations will be on networks managed by companies like Comcast, Spectrum, and AT&T that block downstream mail servers (that's you) from sending email. The solution is to use Gmail or your local ISP as a smart relay host to send mail from your server. You'll need this to deliver voicemails via email. Here's how to set it up using a Gmail account without two-step authentication. Log into your server as root and run `dpkg-reconfigure exim4-config`. Choose "mail sent by smarthost; received via SMTP or fetchmail." Accept all the defaults until you get to Outgoing Smarthost prompt. Enter: **smtp.gmail.com:587**. At the following prompts, choose NO, NO, mbox, and NO. When the setup completes, edit `/etc/exim4/passwd.client` and insert the following line using your

Gmail AcctName and AcctPW. NOTE: If you are using a Gmail account with 2-step verification enabled, you MUST use a Gmail App Key instead of your Gmail account password. You also must enable Less Secure Apps access to your Gmail account.

```
smtp.gmail.com:AcctName@gmail.com:AcctPW
```

Save the file and then issue the following commands to complete the setup:

```
update-exim4.conf
systemctl restart exim4
exim4 -qff
```

Now send yourself a test email message to make sure things are working properly:

```
echo "test" | mail -s testmessage yourname@yourmailprovider.com
```

Once you have email messages flowing, incoming faxes automatically will be delivered to the email address you assigned when setting up your PBX. You can change this email address with the command: *avantfax-email-change*.

Some prefer an email notification whenever your server is booted. Once you have configured a relay host above, you can add the feature by editing */etc/rc.local* and adding the following lines with your actual email address just above the *service knockd start* line:

```
_PRIVATE="Private IP: `cat /etc/hostip | cut -f1-2 -d " "`"
_PUBLIC=" Public IP: `curl -s -S --user-agent \\  
"Mozilla/4.0" http://myip.incrediblepbx.com | awk 'NR==2'`"
echo "$_PRIVATE\\n$_PUBLIC" | mail -s "RasPi 2020 has booted"
yourname@yourmailserver.com
```

## Configuring Inbound Routes for Fax Detection

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Not all VoIP trunks support fax transmission, e.g. Vitelity. Assuming yours do and you'll only know by trial and error, here's how to configure FreePBX to automatically detect incoming faxes and process them for PDF delivery by email. The default inbound route is preconfigured to support email delivery of your faxes. So, any trunks using that default route require no further configuration. If you add additional Inbound Routes, here's how to enable fax detection on those routes.

Under the Fax tab of each new Inbound Route, enter the following settings:

```
Detect Faxes: YES
Fax Detection Type: SIP
Fax Ring: YES
Fax Detect Time: 4
Fax Destination: Custom Destinations -> Fax (Hylafax)
```

ttyIAX0 [idle]   ttyIAX1 [idle]   ttyIAX2 [idle]   ttyIAX3 [idle]

Select All Faxes

<input type="checkbox"/>		<p>From: BALTIMORE, MD Date: 16.02.2020 09:41</p>	<p>Device: ttyIAX0 Pages: 1</p>	
<input type="checkbox"/>		<p>From: SEATTLE, WA Date: 16.02.2020 09:32</p>	<p>Device: ttyIAX0 Pages: 1</p>	

(2 faxes)

## Managing Faxes with AvantFax

You can manage your incoming and outgoing faxes using AvantFax. Click on the AvantFax tab in FreePBX to access it. The default credentials are *admin:password*. When you first access AvantFax with a browser, you may get a missing page error. Just press the back arrow key in your browser and the AvantFax main page will appear.

If you want to change the admin password for AvantFax, log into your server as root with SSH/Putty and issue the command: */root/avantfax-pw-change*.

Send yourself a fax at no cost in the United States from [FaxZero](#).

## Building the Incredible PBX Demo IVR

If you'd like to try your hand at building an IVR, here are the steps to build the Incredible PBX Demo IVR. From the FreePBX Dashboard, choose **Applications -> IVR -> Add IVR**. Then fill in the template using the entries shown below. Then click **Submit** and **Reload Dialplan**.

## – IVR General Options

IVR Name [?](#)

Demo IVR

IVR Description [?](#)

Demo IVR

## – IVR DTMF Options

Announcement [?](#)

ivr-Allison

Enable Direct Dial [?](#)

Disabled

Force Strict Dial Timeout [?](#)

Yes

**No**

No - Legacy

Timeout [?](#)

10

Alert Info [?](#)

None

Ringer Volume Override [?](#)

None

Invalid Retries [?](#)

0

Append Announcement to Invalid [?](#)

Yes

**No**

Return on Invalid [?](#)

Yes

**No**

Invalid Recording [?](#)

None

Invalid Destination [?](#)

Terminate Call

Congestion

Timeout Retries [?](#)

0

Append Announcement on Timeout [?](#)

Yes

**No**

Return on Timeout [?](#)

Yes

**No**

Timeout Recording [?](#)

None

Timeout Destination [?](#)

Terminate Call

Congestion

Return to IVR after VM [?](#)

Yes

**No**

## — IVR Entries

Digits <sup>?</sup>	Destination <sup>?</sup>	Return <sup>?</sup>
0	Extensions 53669 LENNY	Yes No
1	Misc Destinations Call by Name	
2	Conferences 2663 CONF	
3	Misc Destinations Wolfram Alpha	
4	Extensions 53669 LENNY	Yes No
5	Misc Destinations News	
6	Misc Destinations Weather by ZIP Code	
7	Misc Destinations Today in History	
8	Ring Groups 777 FirstFive	
9	Extensions 53669 LENNY	Yes No

## Building the Incredible PBX Stealth AutoAttendant

Many users prefer to play an announcement to incoming callers with a brief pause thereafter which indicates that the call is being connected. If configured properly, this lets you embed several dial codes which can be entered while the announcement is playing and the call is being transferred. For example, you might wish to route incoming calls to Lenny if a caller presses 0. Or you might wish to immediately route an incoming call to a Ring Group if the caller presses 1. Here's a sample IVR setup to get you started.

**IVR General Options**

IVR Name: Stealth AutoAttendant

IVR Description: Add your undisclosed dial codes for secret connections to PBX services

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**IVR DTMF Options**

Announcement: nv-GenericWelcome

Enable Direct Dial: Enabled

Force Strict Dial Timeout:  Yes  No  No - Legacy

Timeout: 7

Alert info: None

Ringer Volume Override: None

Invalid Retries: 0

Append Announcement to Invalid:  Yes  No

Return on Invalid:  Yes  No

Invalid Recording: None

Invalid Destination: Ring Groups  
777 FirstFive

Timeout Retries: 0

Append Announcement on Timeout:  Yes  No

Return on Timeout:  Yes  No

Timeout Recording: None

Timeout Destination: Ring Groups  
777 FirstFive

Return to IVR after VM:  Yes  No

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**IVR Entries**

Digits	Destination	Return
0	Extensions 53669 LENNY	<input checked="" type="radio"/> Yes <input type="radio"/> No
1	Ring Groups 777 FirstFive	

## Incredible PBX 2020 Administration

We've eased the pain of administering your new PBX with a collection of scripts which you will find in the /root folder after logging in with SSH or Putty. Here's a quick summary of what each of the scripts does.

**admin-pw-change** lets you update the admin password for web browser access to the Incredible PBX GUI.

**apache-pw-change** lets you update the admin password for Apache applications such as AsteriDex and Reminders.

**avantfax-pw-change** lets you update the root password for AvantFax access (coming soon!).

**add-fqdn** is used to whitelist a fully-qualified domain name in the firewall. Because Incredible PBX 2020 blocks all traffic from IP addresses that are not whitelisted, this is what you use to authorize an external user for your PBX. The advantage of an FQDN is that you can use a dynamic DNS service to automatically update the IP address associated with an FQDN so that you never lose connectivity.

**add-ip** is used to whitelist a public IP address in the firewall. See the [add-fqdn](#) explanation as to why this matters.

**del-acct** is used to remove an IP address or FQDN from the firewall's whitelist.

**configure-exim-email** lets you reconfigure the email server if you need to use an SMTP relay such as Google to get outbound email flowing. [Tutorial here](#).

**iptables-restart** is the ONLY command you should ever use to restart the IPtables firewall and Fail2Ban.

**knock.FAQ** contains your PortKnocker credentials for emergency access to your server if the firewall locks you out. [Tutorial here](#).

**proximity** (once configured) will automatically forward calls to your cellphone when you are out of BlueTooth range from your RasPi. Also must enable running of script in `/etc/crontab`.

**reset-conference-pins** is a script that automatically and randomly resets the user and admin pins for access to the preconfigured conferencing application. Dial C-O-N-F from any registered SIP phone to connect to the conference.

**reset-extension-passwords** is a script that automatically and randomly resets ALL of the SIP passwords for extensions 701-705. Be careful using this one, or you may disable existing registered phones and cause Fail2Ban to blacklist the IP addresses of those users. *HINT*: You can place a call to the Ring Group associated with all five extensions by dialing 777.

**reset-reminders-pin** is a script that automatically and randomly resets the pin required to access the Telephone Reminders application by dialing 123. It's important to protect this application because a nefarious user could set up a reminder to call a number anywhere in the world assuming your SIP provider's account was configured to allow such calls.



**rpi-clone** is a utility that makes it easy to make a bootable image of the microSD card used to start your Raspberry Pi. You'll need a USB-to-microSD adapter to begin. Insert a backup microSD card large enough to hold all of the data on the primary microSD card (`df -h`). Insert the USB stick with the card. Identify the backup microSD card, usually `sda` (`fdisk -l`). Format the backup microSD card: `mkfs.vfat /dev/sda1 && mkfs.ext4 /dev/sda2`. Then issue the following command to clone the primary microSD card: **rpi-clone -f sda**. [Tutorial here](#). **show-feature-codes** is a cheat sheet for all of the feature codes which can be dialed from any registered SIP phone. It documents how powerful a platform Incredible PBX 2020 actually is. A similar listing is available in the GUI at *Admin -> Feature Codes*.

**show-passwords** is a script that displays ALL of the passwords associated with Incredible PBX 2020. This includes SIP extension passwords, voicemail pins, conference pins, telephone reminders pin, and your Anveo Direct outbound calling pin (if configured). Note that voicemail pins are configured by the user of a SIP extension the first time the user accesses the voicemail system by dialing `*97`.

**timezone-setup** lets you reconfigure the correct time zone for your server.

**purge-cdr-cel-records** cleans out all existing entries in both the CDR and CEL tables of the Asterisk CDR database.

**log-cleanup** removes all entries from most of the logs in `/var/log`.

**sig-fix** disables module signature checking in FreePBX. It is automatically disabled upon installation.

**readme-RonR.txt** documents the scripts provided from RonR build. We do NOT recommend using the FCC Blacklist because of its current size.

**update-asterisk16** is a utility that updates Asterisk 16 to the latest release. This should only be necessary when a security issue or bug is identified that affects the operation of your PBX.

**update-IncrediblePBX** is the Automatic Update Utility which checks for server updates from incrediblepbx.com every time you log into your server as root using SSH or Putty. Do NOT disable it as it is used to load important fixes and security updates when necessary. We recommend logging into your server at least once a week.

**pbxstatus** (shown above) displays status of all major components of Incredible PBX 2020.

**Forwarding Calls to Your Cellphone.** Keep in mind that inbound calls to your DIDs automatically ring all five SIP extensions, 701-705. The easiest way to also ring your cellphone is to set one of these five extensions to forward incoming calls to your cellphone. After logging into your PBX as root, issue the following command to forward calls from extension 705 to your cellphone: `asterisk -rx "database put CF 705 6781234567"`

To remove call forwarding: `asterisk -rx "database del CF 705"`

## Keeping FreePBX 15 Modules Current

---

We strongly recommend that you periodically update all of your FreePBX modules to eliminate bugs and to reduce security vulnerabilities. Make a backup image with **rpi-clone** first! From the Linux CLI, log into your server as root and issue the following commands:

```
fwconsole ma upgradeall
rm -f /tmp/*
fwconsole reload
/root/sig-fix
```

## Upgrading Asterisk 16 to Asterisk 18

---

For those that enjoy living on the bleeding edge, we've create a script which makes it easy to upgrade Incredible PBX 2020 to Asterisk 18. The tutorial is available on the new [Incredible PBX Wiki](#) along with dozens of other tutorials.

---

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Tags: [asterisk](#) — [fax](#) — [freepbx](#) — [IncrediblePBX](#) — [raspberrypi](#) — [trunking](#)

# Icing on the Cake for Incredible PBX 16-15 and Raspberry Pi

[nerdvittles.com/icing-on-the-cake-with-incredible-pbx-16-15-for-raspberry-pi](http://nerdvittles.com/icing-on-the-cake-with-incredible-pbx-16-15-for-raspberry-pi)



In [our last article](#), we introduced Incredible PBX® 16-15 featuring Asterisk® 16 and FreePBX® 15 on the new Raspberry Pi 4 with Raspbian 10. But we're just getting started. Today we want to show off the real power of this \$35 on-premise platform with the addition of IBM's voice recognition software. Your first 500 minutes a month are free. In conjunction with Incredible PBX, you'll get flawless transcription and email delivery of your voicemail messages plus a voice dialer that lets you call anyone in your AsteriDex phonebook by simply dialing 411 and saying the name of the person or company you wish to call. We've got a few more surprises plus some tips for the \$5.95 [Blinkt](#) rainbow light show that will have your friends drooling with envy. If you haven't yet installed Incredible PBX 16-15, [start there](#).

## Configuring Gmail as Exim Smart Relay Host

Before you can receive voicemail messages by email, your server needs to be able to successfully send email messages. Most Raspberry Pi implementations will be on networks managed by companies like Comcast, Spectrum, and AT&T that block downstream mail servers (that's you) from sending email. The solution is to use Gmail or your local ISP as a smart relay host to send mail from your server. Here's how to set it up using a Gmail account without two-step authentication. Log into your server as root and run `./configure-exim-mail`. Choose "mail sent by smarthost; received via SMTP or fetchmail." Accept all the

defaults until you get to Outgoing Smarthost prompt. Enter: **smtp.gmail.com::587**. At the following prompts, choose NO, NO, mbox, and NO. When the setup completes, edit */etc/exim4/passwd.client* and insert the following line using your Gmail *AcctName* and *AcctPW*. NOTE: If you are using a Gmail account with 2-step verification enabled, you MUST use a Gmail App Key instead of your Gmail account password.

```
*.google.com:AcctName@gmail.com:AcctPW  
smtp.gmail.com:AcctName@gmail.com:AcctPW
```

Save the file and then issue the following commands to complete the setup:

```
update-exim4.conf  
systemctl restart exim4  
exim4 -qff
```

Now send yourself a test email message to make sure things are working properly:

```
echo "test" | mail -s testmessage yourname@yourmailprovider.com
```

Some prefer an email notification whenever your server is booted. Once you have configured a relay host above, you can add this feature by editing */etc/rc.local* and adding the following lines just above the *service knockd start* line using your actual email address:

```
_PRIVATE="Private IP: `cat /etc/hostip | cut -f1-2 -d " "`"  
_PUBLIC=" Public IP: `curl -s -S --user-agent \<\  
"Mozilla/4.0" http://myip.incrediblepbx.com | awk 'NR==2'`"  
echo "$_PRIVATE\\n$_PUBLIC" | mail -s "RasPi 16-15 has booted"  
yourname@yourmailserver.com
```

Why IBM's speech recognition breakthrough matters for AI and IoT. Via [@techrepublic](https://t.co/AJi8MA3E20)

— IBM Developer (@IBMDeveloper) [March 15, 2017](https://t.co/AJi8MA3E20)

## Obtaining IBM Cloud Speech to Text Credentials

---

Follow [this link](#) to set up your IBM account and obtain credentials for both Speech to Text (STT) and Text to Speech (TTS) services. Please note that your STT and TTS API keys will NOT be the same. So don't accidentally use the wrong one. For today, we'll need your STT API Key.

## Installing STT Engine for Voicemail Transcription

---

Now we're ready to deploy IBM's STT Engine to (1) transcribe your voicemails and (2) deliver them by email. To begin, open the Incredible PBX web GUI with your browser and edit extension 701 under *Applications -> Extensions*. Click on the *Voicemail* tab. Enter an **Email Address** for delivery of your voicemails. Set **Email Attachment**, **Play CID**, and **Play**

**Envelope** to **YES**. After testing things out, you may want to actually **Delete Voicemails** after email delivery, but leave it set to **NO** for the time being. Click **Submit** and **Apply Config** to save your settings.

Next, log into the Linux CLI as root and change to the /usr/local/sbin directory. Then copy the sendmailmp3.ibm file to sendmailmp3: Then edit sendmailmp3.

```
cd /usr/local/sbin
cp -p sendmailmp3.ibm sendmailmp3
nano -w sendmailmp3
```

Scroll down to line #21 and enter your actual **API\_KEY** replacing the X's inside the quotes. Save the file: **Ctrl-X, Y**, then **ENTER**. Now call extension 701's voicemail (\*701) and leave yourself a short voicemail message. Within a minute or two, it should be delivered to your email address that you specified for extension 701 voicemails. It will include the voicemail recording as well as a transcription.

## Deploying the AsteriDex Voice Dialer

---

AsteriDex is an open source database that is included in every Incredible PBX deployment. You can access it within the web GUI under the **Third Party Addon** tab. By default, it includes entries for some of the major airlines. You can create as many additional entries as you wish. Also included with Incredible PBX is a voice dialer that is accessed by dialing 411. You'll be prompted for the name of the person or company to contact. Once you say the name, the voice dialer will place the call using your default outbound route for 10-digit calls. The missing piece is voice recognition software to transcribe what you say into text that can be looked up in AsteriDex to retrieve the number to call. That's where IBM's STT engine enters the picture. To deploy it, start by replacing the 411 context in your dialplan. Then we'll edit the getnumber.sh shell script and insert your STT credentials.

```
cd /var/lib/asterisk/agi-bin
sed -i '\:// BEGIN Call by Name:,\:// END Call by Name:d' \
/etc/asterisk/extensions_custom.conf
sed -i '/\[from-internal-custom\]/r /var/lib/asterisk/agi-bin/ibm-411.txt' \
/etc/asterisk/extensions_custom.conf
asterisk -rx "dialplan reload"
nano -w getnumber.sh
```

Scroll down to line #13 and make it look like this: `API_USERNAME="apikey"`

On Line #14, enter your actual **API\_KEY** between the quotation marks replacing the X's. Then save the file: **Ctrl-X, Y**, then **ENTER**.

Now pick up a phone connected to your PBX and dial 411. When prompted for the person/company to call, say "American Airlines."

## Move Over Siri. Here Comes Iris.

---

If the idea of instant access to all the world's information is appealing but you're not quite ready to invite Siri, Alexa, and Google into your bedroom, then IRIS may be your cup of tea. With the [Incredible PBX implementation of Wolfram Alpha](#), you simply dial I-R-I-S (4747) from any phone, ask a question, and the world's greatest almanac tied to a supercomputer will provide you an answer. So long as it's for non-commercial use, you get 2,000 free queries a month just by [signing up for a Wolfram Alpha account](#). Here's a sample of what's available:

**Weather in Charleston South Carolina**

**Weather forecast for Washington D.C.**

**Next solar eclipse**

**Otis Redding**

**Define politician**

**Who won the 1969 Superbowl?** (Broadway Joe)

**What planes are flying overhead now?** (flying over your server's location)

**Ham and cheese sandwich** (nutritional information)

**Holidays 2019** (summary of all holidays for 2019 with dates and DOW)

**Medical University of South Carolina** (history of MUSC)

**Star Trek** (show history, air dates, number of episodes, and more)

**Apollo 11** (everything you ever wanted to know)

**Cheapest Toaster** (brand and price)

**Battle of Gettysburg** (sad day )

**Daylight Savings Time 2019** (date ranges and how to set your clocks)

**Tablets by Motorola** (pricing, models, and specs from Best Buy)

**Doughnut** (you don't wanna know)

**Snickers bar** (ditto)

**Weather** (local weather at your server's location)

Deploying IRIS is simple. Once you have your Wolfram Alpha APP-ID, edit the *4747* file in */var/lib/asterisk/agi-bin* and insert your **APP-ID** in the first line of the file. Then save it. In the same directory, edit *wolfram.sh* and enter *apikey* for your **API\_USERNAME**, your actual IBM STT API key as your **API\_PASSWORD**, and reenter your Wolfram Alpha **APPID**. Then save the file. Now dial I-R-I-S (4747) from any phone and ask one of the sample questions above.

**UPDATE:** A bug crept into the Wolfram Alpha scripts somewhere along the way. Here's the fix, but you don't need to install it. Simply log out and back into your Raspberry Pi as root, and the Automatic Update Utility will install it for you.

```
cd /var/lib/asterisk/agi-bin
sed -i 's|results.chr(13).chr(10);|results.chr(13).chr(10).chr(34);|' 4747.php
```

## Using Allison's Demo IVR for Feature Set Access

---

Rather than remembering all of the dial codes we've documented above, the easiest way to get instant access to all the features we've discussed plus more is to dial D-E-M-O (3366) from any phone connected to your PBX. Better yet, you can share the feature set with your friends by configuring the Demo IVR as the Inbound Route Destination for one of your DIDs. Be careful sharing your password for Telephone Reminders to avoid having some creep schedule multiple reminders to make expensive calls to some ship in the middle of nowhere.

## Updating pbxstatus to Support NeoRouter

---

If you have deployed the NeoRouter VPN on your server, you've probably noticed that the pbxstatus display looks a bit awkward now since there are multiple local IP addresses. Here's the fix. Edit /usr/local/sbin/pbxstatus. Scroll down to line #6 and replace it with the following. Then save the file.

```
_IP=" Private IP: `cat /etc/hostip | cut -f1-2 -d " "`"
```

## Adding Blinkt for Non-Blacklisted Incoming Calls

---

If you deployed the Blinkt hardware addition following our [last tutorial](#), we wanted to add an additional feature that will provide visual alerts when incoming calls arrive. Here's how:

```
cp -p /root/rainbow.py /usr/local/sbin/.
echo "asterisk ALL = NOPASSWD: /usr/local/sbin/rainbow.py" >> /etc/sudoers
echo '[app-blacklist-check]
include => app-blacklist-check-custom
exten => s,1(check),GotoIf($["${BLACKLIST()}"]="1"?blacklisted)
exten => s,n,Set(CALLED_BLACKLIST=1)
exten => s,n,System(/usr/bin/sudo /usr/local/sbin/rainbow.py &)
exten => s,n,Return()
exten => s,n(blacklisted),Answer
exten => s,n,Set(BLDEST=${DB(blacklist/dest)})
exten => s,n,ExecIf($["${BLDEST}"]=""?Set(BLDEST=app-blackhole,hangup,1))
exten => s,n,GotoIf($["${returnhere}"]="1"?returnto)
exten => s,n,GotoIf(${LEN(${BLDEST})}?${BLDEST}:app-blackhole,zapateller,1)
exten => s,n(returnto),Return()
;--== end of [app-blacklist-check] ==--;
' >> /etc/asterisk/extensions_override_freepbx.conf
asterisk -rx "dialplan reload"
```

***Originally published: Monday, August 19, 2019***

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