

# **EarShot IFB**

Product Manual

**COMPREX**

# Comrex EarShot IFB Manual

---

## I. Comrex Introduction 4

---

## II. EarShot IFB 5

---

INTRODUCTION 5

ABOUT MIX-MINUS 6

## III. Setting Up EarShot IFB 7

---

HARDWARE ATTACHMENTS AND CONNECTIONS 7

AUDIO CONNECTIONS 8

CONTACT CLOSURES 8

MAKING CONNECTIONS 8

## IV. Setting up EarShot IFB IP Information 10

---

INTRODUCTION 10

CONFIGURING EARSHOT IFB IP INFORMATION 10

## V. Operation of EarShot IFB 15

---

## VI. Telephone Connections 16

---

INTRODUCTION TO SIP 16

SETTING UP A SIP PROVIDER OR PBX 17

CONFIGURING FOR A PBX 20

GATEWAYS 20

SIP TRUNKS 21

## **VII. System Behavior 24**

---

AUDIO SETTINGS	24
IFB SETTINGS	25
OTHER OPTIONS	26
PINS	27

## **VIII. More About SIP 28**

---

NAT ROUTER ISSUES WITH SIP	29
----------------------------	----

## **IX. Why do I Hear Hear Myself Myself? 31**

---

MIX-MINUS AND ELIMINATING ECHO	31
--------------------------------	----

## **X. Information for IT Managers About EarShot IFB 35**

---

MAINFRAME	35
-----------	----

## **XI. Software Licenses 37**

---

# I. Comrex Introduction

---

## About Comrex

Comrex has been building reliable, high quality broadcast equipment since 1961. Our products are used daily in every part of the world by networks, stations and program producers.

Every product we manufacture has been carefully designed to function flawlessly, under the harshest conditions, over many years of use. Each unit we ship has been individually and thoroughly tested.

Comrex stands behind its products. We promise that if you call us for technical assistance, you will talk directly with someone who knows about the equipment and will do everything possible to help you.

You can contact Comrex by phone at 978-784-1776. Our toll free number in North America is 800-237-1776. Product information along with engineering notes and user reports are available on our website at [www.comrex.com](http://www.comrex.com). Our email address is [info@comrex.com](mailto:info@comrex.com).

## Warranty and Disclaimer

All equipment manufactured by Comrex Corporation is warranted by Comrex against defects in material and workmanship for one year from the date of original purchase, as verified by the return of the Warranty Registration Card. During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective, provided you obtain return authorization from Comrex and return the product, shipping prepaid, to Comrex Corporation, 19 Pine Road, Devens, MA 01434 USA. For return authorization, contact Comrex at 978-784-1776 or fax 978-784-1717.

This Warranty does not apply if the product has been damaged by accident or misuse or as the result of service or modification performed by anyone other than Comrex Corporation.

With the exception of the warranties set forth above, Comrex Corporation makes no other warranties, expressed or implied or statutory, including but not limited to warranties of merchantability and fitness for a particular purpose, which are hereby expressly disclaimed. In no event shall Comrex Corporation have any liability for indirect, consequential or punitive damages resulting from the use of this product.

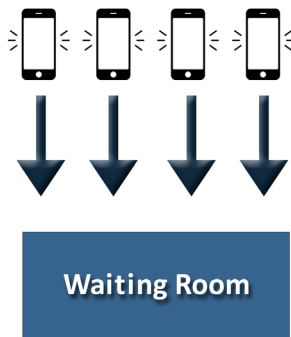
# II. EarShot IFB

## Introduction

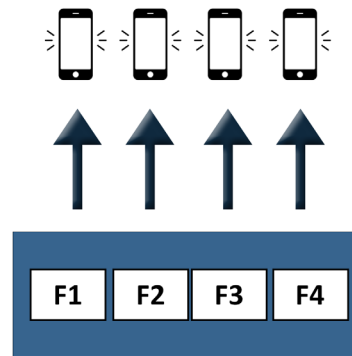
Comrex EarShot IFB is a hardware-based system designed to answer phone calls and deliver live audio feeds to callers. EarShot IFB is designed to provide telephone-based live studio program and IFB audio to field-based remote broadcasts, like TV ENG reports.

EarShot IFB has four audio inputs (or feeds) and callers can choose between these four feeds. Feed choice is made by callers using DTMF (Touch Tone) selection via PIN code. EarShot IFB does not offer studio-based controls of feeds - all controls are managed by callers.

**1) All incoming calls placed in waiting room and asked to enter a pin**

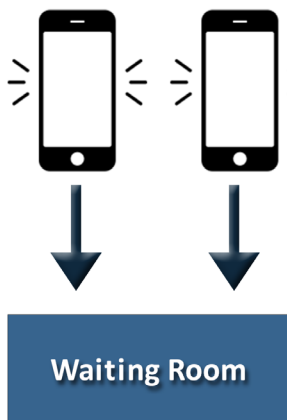


**2) Corresponding feeds are sent to the callers based on the pin entered**

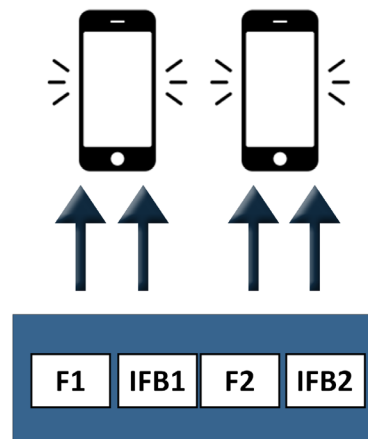


EarShot IFB is capable of providing Interruptible Fold Back (IFB) functionality. Two of the feed inputs to the device can be alternately configured as IFB inputs. When used as IFB, audio activity on this input will "interrupt" the audio of a different feed until the IFB audio ends.

**1) All incoming calls placed in waiting room and asked to enter a pin**



**2) Corresponding feeds and IFB are sent to the callers based on the pin entered**



**Feeds and IFB**

EarShot IFB does not offer studio-side audio output functionality. No output ports to hear callers are provided.

By default, EarShot IFB is a “one-to-many” device that sends only its own feed audio to callers. Callers can, via DTMF, enable their source audio to be added to the mix (to send to other callers on that feed). This creates a conferencing function.

Also by default, incoming callers are placed into a “waiting room” until they input a PIN for a specific feed. As an option, Feed 3 can be chosen to be the “waiting room” feed before any PIN is sent by the caller.

EarShot IFB interfaces only to Voice-over-IP (VoIP) telephone circuits. These virtual phone lines are provided to EarShot IFB over its Ethernet connection. VoIP phone lines can be delivered from cloud-based VoIP providers, VoIP-based PBXs (in many cases), and via hardware gateways devices that bridge legacy phone circuits (e.g. T1/E1, POTS) to VoIP. Separate setup menus are available for each of these. EarShot IFB interfaces to VoIP services using the SIP protocol.

EarShot IFB can interface to most normal calls using standard telephony audio encoding (G.711). In some circumstances, EarShot IFB can deliver audio to “pure” end-to-end VoIP callers with higher fidelity, using encoders like G.722 and Opus.

EarShot IFB can handle thirty calls from standard telephone sources, spread across one, two, three, or four audio feeds. It can handle up to ten simultaneous high fidelity feeds to VoIP callers. It can also handle a mix of both, at varying capacities.

EarShot IFB is housed in a 1U 19” rackmount mainframe chassis. Level of each feed is displayed on front panel LEDs. The mainframe serves a web page that provides all controls and configuration. Initial setup requires use of the Comrex **Device Manager** software utility.

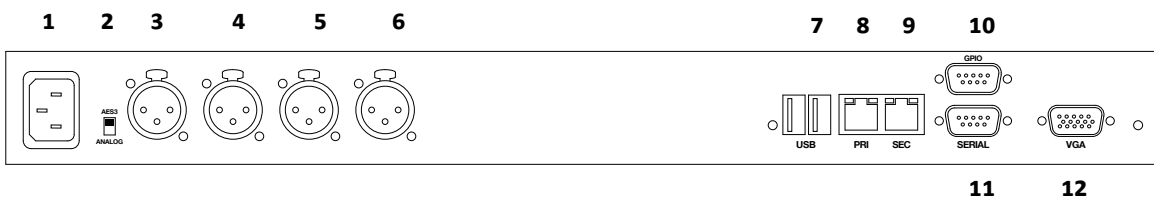
## About Mix-Minus

Comrex support spends a lot of time discussing mix-minus, as it is not an obvious concept. In studio telephony integration, there is a golden rule: People connecting from outside the studio must never be sent their own audio back to themselves. If this rule is not followed, the result will be an unpleasant echo in the caller’s ear. It is the responsibility of the studio tech to connect a feed to each feed on EarShot IFB that is a mix of all important audio sources--in-studio mics, spots, automation etc., minus the caller. Of course, this is only true for EarShot IFB listeners who are “on-air”. Producers, camera operators and others can monitor the full program feed. That’s why EarShot IFB’s selectable feeds are so useful.

# III. Setting Up EarShot IFB

## Hardware Attachments and Connections

The figure below shows the rear panel of the EarShot IFB mainframe:



- 1 Mains Power** - Apply universal mains power (110-240VAC) to the IEC connector here.
- 2 ANALOG/AES3 Input Switch** - This switch determines whether the leftmost XLR connector is used for analog **FEED/IFB1** audio to callers, or is configured as an AES3 digital audio input.
- 3 FEED/IFB 1 INPUT** - In analog mode, this XLR connector should be sent a balanced, 0dBu signal that is heard by callers when they select **FEED 1**, or alternately (if this input is configured as **IFB 1**), when **IFB 1** is active. In digital AES3 mode, both **FEED/IFB 1 INPUT** and **FEED/IFB 2 INPUT** are applied here (on left and right channel, respectively).
- 4 FEED/IFB 2 INPUT** - This XLR connector should be sent a balanced, 0dBu signal that is heard by callers when they select **FEED 2**, or alternately (if this input is configured as **IFB 2**), on a different feed when **IFB 2** is active. This input is disabled when in AES3 mode.
- 5 FEED 3 INPUT** - This XLR connector should be sent a balanced, 0dBu signal that is heard by callers when they select **FEED 3**.
- 6 FEED 4 INPUT** - This XLR connector should be sent a balanced, 0dBu signal that is heard by callers when they select **FEED 4**.
- 7 USB (x2)** - Connect a keyboard and mouse to these ports to utilize the **Console IP Setup Interface**.
- 8 Primary Ethernet Port** - Connect your network to this gigabit compatible Ethernet port.
- 9 Secondary Ethernet Port** - If you choose, you can run VoIP services on two different Ethernet networks on Earshot. A typical use case would be to use the primary Ethernet port to connect to a cloud-based VoIP provider, and the secondary port to connect to a PBX or gateway device on a LAN that can't connect to the Internet. **Note: the secondary Ethernet port offers only static addressing.**
- 10 Contact Closure Connector** - This contains 4 contact closure input and output signals, for various remote control and tally functions as described further on.
- 11 Serial Port** - This is an RS-232 connector that presents a serial port for future use.
- 12 VGA** - Computer video port. Attach a monitor here for **Console IP Setup Interface**.

## Audio Connections

All analog XLR audio inputs have a nominal level of 0dBu (full scale +20dBu). AES3 inputs support 32, 44.1, and 48KHz sampling rates. AES3 inputs are only provided for FEED/IFB ports 1 and 2.

### Analog input pinouts:

Pin 1	Ground
Pin 2	Balanced audio +
Pin 3	Balanced audio -

### AES3 input pinouts:

Pin 1	Ground
Pin 2	Data +
Pin 3	Data -

## Contact Closures

Contact closure signals are available via the male 9-pin D connector on the back of the EarShot IFB. Inputs are triggered by shorting the respective input to Pin 5. Outputs consist of an open collector circuit which, when inactive, will offer a high-impedance path to Pin 5 and, when active, will offer a low-impedance path to Pin 5. These outputs are capable of sinking up to 200mA at a voltage up to 12V. Do not switch AC mains power using these contacts.

In current firmware, only the four CC outputs are utilized. These outputs are triggered whenever a call is assigned to a numbered feed. E.g. if an incoming call selects **Feed 2** option, **CC #2** will close for the duration of the feed.

### Contact Closure Pinouts:

Pin 1	Input #1	Pin 4	Input #4	Pin 7	Output #2
Pin 2	Input #2	Pin 5	Ground	Pin 8	Output #3
Pin 3	Input #3	Pin 6	Output #1	Pin 9	Output #4

## Connecting Up EarShot IFB

At a minimum, EarShot IFB will need one audio connection and a network connection. Levels of all analog audio I/O is 0dBu (0.775V) nominal. This level will provide 20dB headroom before the clipping point. Input audio is reflected on the front panel LED based peak meters as indicated in the figure below. Clipping is indicated by the red LED on these meters.



EarShot IFB needs a network connection to be useful. On EarShot IFB, network connections are made via a standard 1000Base-T Ethernet connection on an RJ-45 connector.



In most ways, EarShot IFB will look like an ordinary computer to this network. In fact, EarShot IFB contains an embedded computer with a Linux-based operating system and a full network protocol stack.

EarShot IFB is perfectly capable of working over most LANs, but there may be situations where a LAN is heavily firewalled, subject to overloaded traffic conditions, or has security concerns. Better performance is possible if EarShot IFB has its own Internet connection.

Since there may be bandwidth, firewall, and security concerns with installing EarShot IFB on a managed LAN, it is recommended that your IT manager be consulted in these environments. The details that follow assume a working knowledge of IT topics and network configuration.

On EarShot IFB, the single Ethernet port handles connections to your phone lines and the **Toolbox** configuration interface. IP addressing can be DHCP or Static, but if you are often accessing the **Toolbox** interface of your system, you will likely need to assign a Static IP address to the Primary ethernet port in order for the browsers to find the mainframe.

EarShot IFB has a single “**Status**” indicator on the front panel. It reflects different colors based on the status of the system:

- **Red**: No network is detected or the network is incompatible
- **Blue**: Network is connected and unit is in subsystem booting process
- **Magenta**: Network is connected and unit is fully booted but no SIP Provider is registered
- **Green**: Network is connected, unit is booted, SIP Provider is registered and unit is ready to receive calls
- **White**: Active call in progress on unit

# IV. Setting up EarShot IFB IP Information

---

## Introduction

EarShot IFB features two Ethernet ports (Primary and Secondary), which provide the following functionality to the system:

- Voice-over-IP service provider accounts
- Attachment to PBXs
- Attachment to gateway devices (bridges to POTS, ISDN, E1/T1, etc.)
- Connection to Comrex **Device Manager** software
- Connection to the **Toolbox** Web-based Config Utility pages

## Configuring EarShot IFB IP Information

EarShot IFB is shipped from the factory set to DHCP mode, so it will automatically find an address on your network, if possible. The easiest way to find what that address is to use the Comrex **Device Manager** software, available on our website for both Windows and Mac platforms. You can also use **Device Manager** to upgrade the firmware on your EarShot IFB.

While it's not technically required for EarShot IFB to have a static IP address, if the DHCP address changes you'll need to find the new address in order to configure the EarShot IFB via the **Toolbox** interface.

Each Ethernet port can be configured with a static IP address. This is most common, as it allows you to "find" the mainframe on your network and call up the EarShot IFB Web GUI Interface at the fixed address.

There are three ways to set the static IP addressing for the two ethernet ports: Console IP Setup Interface (i.e. connecting a keyboard, mouse and video monitor directly to the EarShot IFB), **Device Manager's** "rescue mode", or through **Toolbox**.

### Console IP Setup Interface

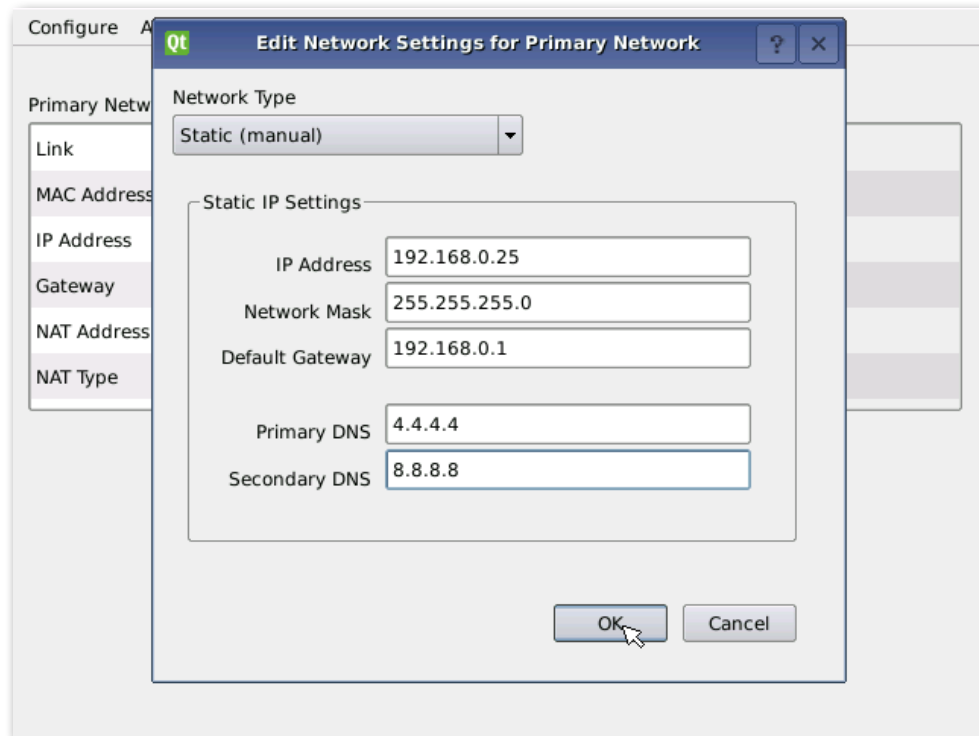
The console interface is shown below.

EarShot IFB has two Ethernet ports, labeled **Primary** and **Secondary**.

By default, the Primary Ethernet port is set to DHCP and the Secondary Ethernet port is disabled. The Secondary port can be enabled via the console interface by choosing **Configure->Secondary Network**, selecting the box labeled "**Disabled**" and changing the selection to "**Static**". (Please note: The Secondary network **does not** support DHCP.) The Secondary Network **must** be enabled in the Console interface. Changes made in the web-based Toolbox interface to the Secondary network will have no effect if it's not first enabled in the console.

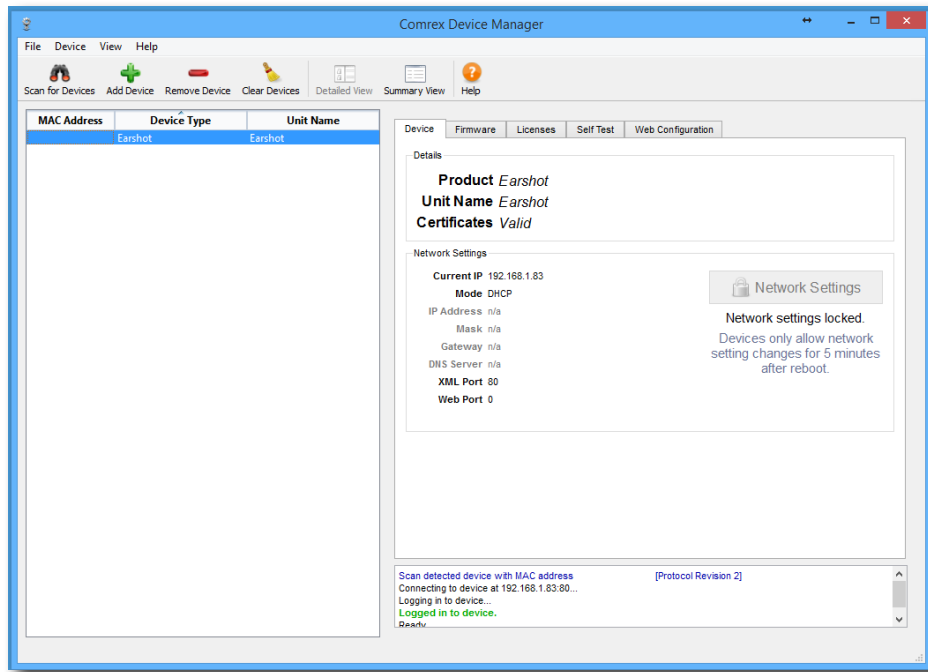
You will choose one of the possible configurations for each of the Ethernet ports. In the case of Static addressing, you'll need to know the following information:

- The Static IP address you'd like to assign to the EarShot IFB Ethernet port
- The Network Mask used on the network
- The Gateway address used on the network
- The DNS address(es) used by your network



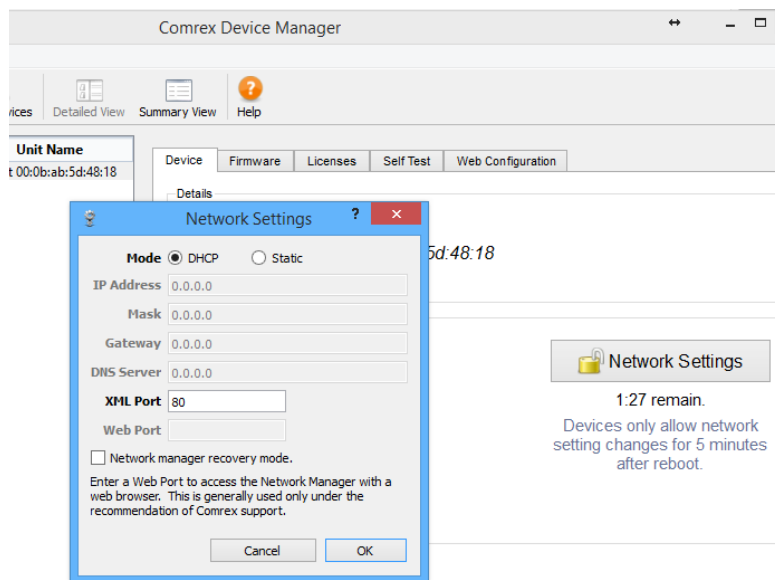
## Device Manager

Install **Device Manager** on a computer on the same physical LAN as the EarShot IFB. (This is important, because Device Manager can generally only access devices that are on the same network it is using.) Once installed and run, press the “**Scan for Devices**” button in the upper left corner to scan your network for Comrex products. The results should look like this:



There are two ways to set/reset the static IP information on the EarShot IFB: using **Device Manager** or utilizing **Toolbox**. (The **Toolbox** option is described in the following section.)

**Device Manager** can be used to set static IP settings via the program’s “**rescue**” mode, which allows you to change parameters during the first five minutes after a unit has been rebooted, and is initiated by selecting the “**Network Settings**” button on the right pane. This option is especially useful if you’ve forgotten the unit login password.

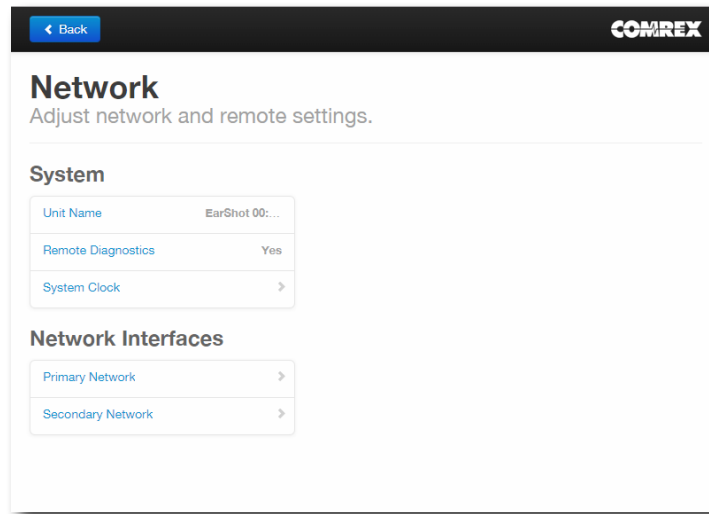


## Toolbox

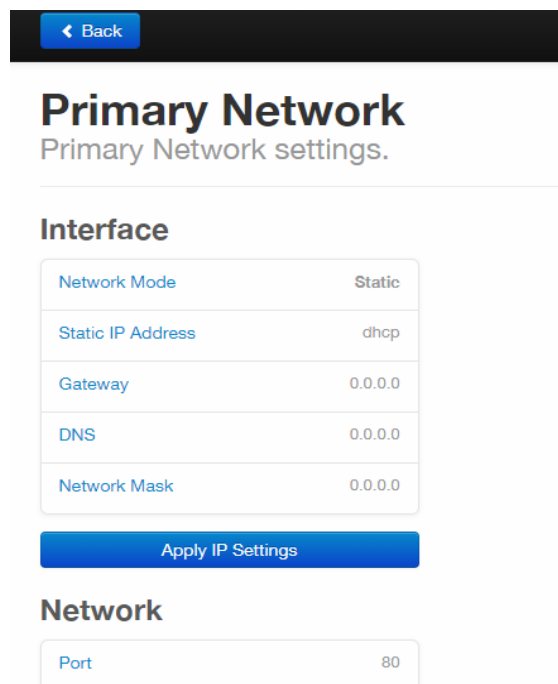
The normal mode of changing any settings in EarShot IFB is by clicking the “**Web Configuration**” tab in the right pane of **Device Manager**. This opens the unit’s **Toolbox** interface. **Toolbox** is a web-based interface that allows you to set all relevant parameters of the product. Once you know the unit’s IP address, **Toolbox** can also be accessed via a browser by going to **http://<ip-address>/cfg**.

**Toolbox** requires that you log on with a username and password. The default user name is “**admin**” and the default password is “**comrex**”. We **strongly recommend** that users change the default password, especially if their EarShot IFB is exposed directly to the Internet.

Once you’ve logged in, choose the “**Network**” option. You should see the following screen:



Select the network you would like to configure (Primary or Secondary) and choose the entry under **Network Mode**. The factory default setting for the Primary network is DHCP. As noted on **page 10**, the Secondary network is disabled by default and must be enabled in the console interface before it can be configured here. The Secondary network supports only Static addressing.



← Back

## Primary Network

Primary Network settings.

---

### Interface

Network Mode	Static
Static IP Address	dhcp
Gateway	0.0.0.0
DNS	0.0.0.0
Network Mask	0.0.0.0

Apply IP Settings

### Network

Port	80
------	----

Change the mode to **Static**, and input the IP address, Netmask, Gateway and DNS information for your network. Then click **“Apply IP Settings”**.

Please note: If you need to access **Toolbox** via **Device Manager** after this, you’ll need to click **“Scan for Devices”** and log in again. Alternatively, you can open a browser to the new IP address (**http://<new-ip-address>/cfg**) and log in that way.

The **Primary Network** page is also where you can adjust the port for web and xml services. Select **Port** under **Network** (at the bottom of the screen) and enter the port number you would like to use. Be sure to press **Save** once you’ve finished making your changes.

There are some additional **“System”** settings in the **Toolbox Network** section that can also be adjusted. They are:

- **Unit Name:** By default, the unit name is **“EarShot”** folowed by the MAC address of the Primary Etehernet port. We encourage users to give their units unique names to make them easier to identify on Device Manager.
- **Remote Diagnostics:** This option (which, by default, is **Off**) allows Comrex Tech Support to use the **ssh protocol** to diagnose problems. Only Comrex holds the encryption key for this port. It is not shared with users for security reasons, and we recommend that it be left off unless you need to activate it to allow Comrex Tech Support to access your unit remotely.
- **System Clock:** These settings control the EarShot IFB’s internal clock and how it synchronizes with the network. Most users leave these settings at their default values, which is perfectly fine.

With each of these options, make sure to press **Save** once you’ve finished making your changes.

# V. Operation of Earshot IFB

---

EarShot IFB only processes incoming calls. By default, callers are parked in a “waiting room”, and a prompt is sent instructing the caller to enter a PIN. The PIN is pre-set by the administrator, and on verification the caller is added to one of the four possible “feeds” based on the PIN. By default, callers can only hear the Feed and not each other.

EarShot IFB has an optional IFB function. In this mode, one or two “**Feed**” inputs are repurposed as IFB inputs and assigned to one of the other “**Feed**” inputs. When audio is active on the IFB input, the level of the “**Feed**” audio is automatically reduced by a fixed amount, and the IFB audio is sent over the **FEED** at normal level. This is designed to allow normal program or mix-minus audio to be sent to a caller, yet allow a producer or director to interrupt the feed momentarily for directions.

As an option, callers can add their own audio to the feed audio to make a conference. This is done with a special DTMF code sent from the caller. This is useful in a scenario where a producer or director is not in the studio, but wishes to add his own audio to the feed via telephone.

# VI. Telephone Connections

---

## Introduction to SIP

SIP (Session Initialization Protocol) is the standard used by EarShot IFB to talk to virtual phone lines. These lines must be created in some way externally before they are “applied” to EarShot IFB. “Applying” SIP lines involves configuring the mainframe with certain information about the lines and the location of the server that delivers them. Then the mainframe can be allowed to register with the SIP server and automatically handle all of the interface with the virtual line.

The SIP line can be delivered from several sources:

- 1 A commercial telephony provider that delivers SIP-based lines over a public or private IP network.
- 2 A PBX that delivers telephony to extensions via SIP (in this case the EarShot IFB mainframe is treated like a PBX extension).
- 3 A hardware gateway device designed to bridge legacy telephone services to SIP. These devices interface to the outside worlds via analog POTS/PSTN cables, T1/E1 circuits, or ISDN. They interface to EarShot IFB via IP over Ethernet.

The setup and interface are identical for options 1 & 2 and similar for option 3.

The first step in setting up a SIP-based phone line is establishing an account with some kind of SIP based provider or PBX. This process can’t be described here, but the result of this process is that you will have access to certain credentials for that account. These typically consist of:

- **Server Domain** - The IP address or URL of the server to which you are being registered.
- **Username** - The name that EarShot IFB will use when logging into the service.
- **Password** - The password associated with your account for security purposes.

In addition, several SIP providers require an **Authorization Username (Auth Username)**, which is often defaulted to be the same as the username but sometimes is required to be different.

SIP is a complex protocol, and is based on Internet standards documents called RFCs. These documents are often subject to interpretation, and some PBXs, gateways, or telephony providers may have some obscure SIP settings requirements to work best with EarShot IFB. However, most should work with just the credentials noted above.

Once EarShot IFB is set up to work with a PBX or Internet Telephony Provider, it will automatically register with the correct server and maintain a connection to the server indefinitely. This way, the provider or PBX can notify EarShot IFB of incoming calls to its phone number.

With hardware gateways, the process is reversed. EarShot IFB will actually emulate a SIP server to the gateway device. The credentials will be entered into the gateway device. EarShot IFB will only need to know the address of the gateway device.

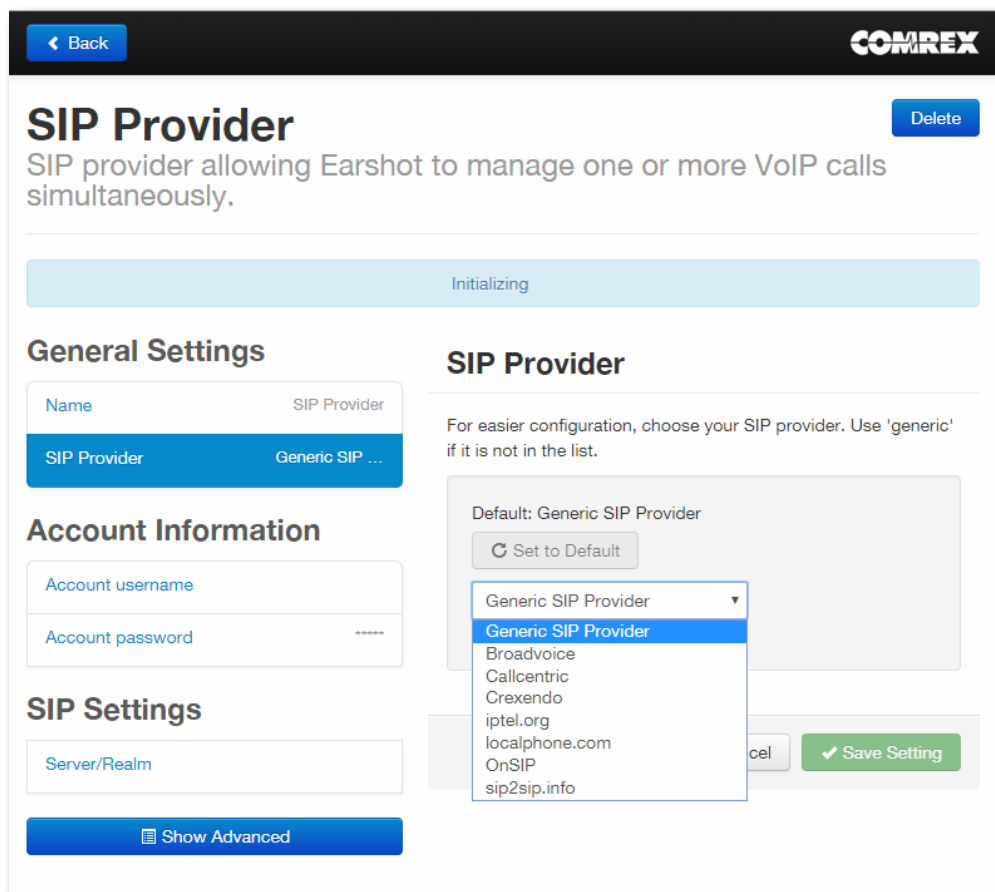


# Setting up a SIP provider or PBX

SIP provider's info is entered using **Toolbox**, a web-based config utility.

In most arrangements, a SIP provider can deliver several telephone channels to you over a single account. When you subscribe to a SIP provider, make sure you understand how many simultaneous channels are provided with that account. These channels will act like a traditional telephone hunt group, so in the case of channel one being busy, calls will be routed to channel two, etc. You are only required to put in your credentials once for each account, even if you have multiple channels.

Along with account credentials, you'll need a Direct Inward Dial (DID) number associated with your account. This is the "old fashioned" phone number users will dial to reach you. EarShot IFB does not need to know this number - translation to the proper SIP channel happens behind the scenes at the SIP provider (although often the DID and SIP account name are the same).



In **Toolbox**, navigate to **Line Configuration->VoIP Providers->Add Provider-> SIP Provider**. The basic settings for a SIP provider are shown in the previous figure. First, you should give your provider a unique name in the "Name" field. This is used for reference only.

Under the SIP Provider entry, we've provided a list of commonly used providers. Using one of these profiles helps set up some of the more obscure settings that we've found necessary for these providers to work correctly. If your provider isn't on the list (or if you're setting up a SIP extension from a PBX) leave this set to "**Generic SIP Provider**".

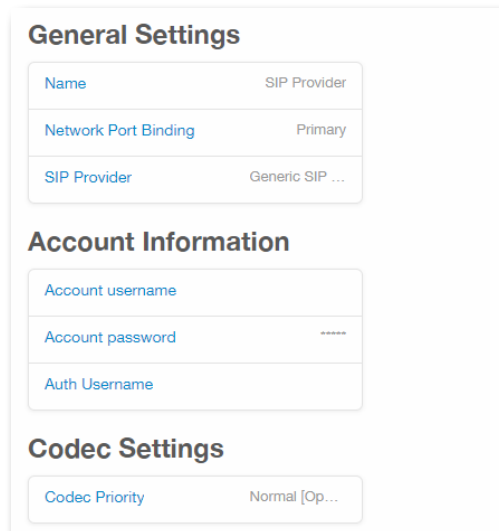
The next three fields are where you should enter your account credentials: **Account Username**, **Account Password**, and **Server/Realm**. These should have been provided to you by the SIP provider. Account username is usually the name at the start of any SIP URI assigned. (More on that later). E.g., **username@sip\_provider**. Make sure to enter only the username part.

The **Server/Realm** is the address of a registration server maintained by the provider. No web prefixes are needed here, just the address. E.g., **sip.comrex.com** or **iptel.org**. If you are programming a PBX extension here, this will be the IP address (or URL) of the PBX.

Under most circumstances this is all you should need. Setting these parameters, clicking **Back** then clicking **Restart** should start the process of EarShot IFB registering with the provider or PBX. However, SIP registration can be tricky in some systems, and if registration fails you should check the required SIP settings carefully and use the **Advanced** SIP settings. Advanced settings are accessible by clicking the Show Advanced button.

## Advanced SIP Settings

By clicking **Show Advanced** in the SIP Setup menu, the list expands to include less used options:



The screenshot displays a web interface for SIP settings, organized into three sections:

- General Settings:** Contains three rows of settings: 'Name' (SIP Provider), 'Network Port Binding' (Primary), and 'SIP Provider' (Generic SIP ...).
- Account Information:** Contains three rows of settings: 'Account username', 'Account password' (masked with asterisks), and 'Auth Username'.
- Codec Settings:** Contains one row of settings: 'Codec Priority' (Normal [Op...]).

### - Under Account Information -

**Auth Username** - By default, this field is set internally to the same as the user. Occasionally, SIP providers require this field be something different than the username, and will outline that in their setup instructions.

# SIP Settings

Provider Binding Port	5085
Server/Realm	
Proxy Address	
Registration Proxy Address	
From Username	
From Domain	
Expire time	3600 seconds
Retry time	60 seconds
Register	Yes
Register Transport	UDP
INVITE SDP Compatibility	On
INVITE Contact Compatibility	Off
Forced Ringback	none

## - Under SIP Settings -

**Provider Binding Port** - This port is assigned by EarShot IFB based on the number of providers you have assigned. Unless required, you should leave the default setting as is.

**Proxy Address** - Most providers use the same server address for incoming call registration and proxying SIP traffic. If your provider shows a different address for proxy, enter it here.

**Registration Proxy Address** - Some providers require **REGISTER** messages be sent to a different server. If your provider has specifically required this, enter the address here.

**From Username, From Domain** - Not applicable to EarShot IFB

**Expire Time, Retry Time** - These values determine how long to wait (without any communication) before the SIP provider will consider the registration connection lost, and once lost, how often to attempt to reestablish. The default values are usually best, unless strictly required to be changed by your provider.

**Register** - If you would like to save SIP provider entries for occasional use, you can set them to be disabled here by setting this value to “**No**”. No registration will be attempted until this setting is changed from “**No**” back to “**Yes**”.

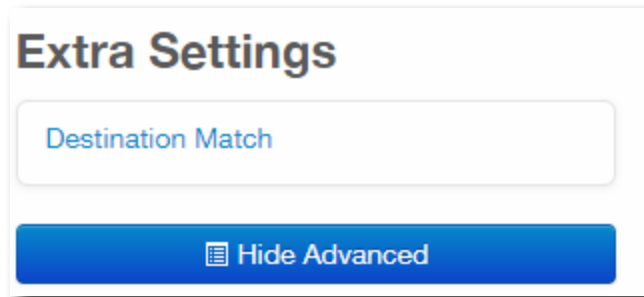
**Register Transport** - Leave this set to “**UDP**” in all but very unusual circumstances.

**INVITE SDP Compatibility** - Optionally enable compatibility mode for SIP INVITE lacking SDP. This setting is required by **Cisco CUCM** and **3Com NBX**.

**INVITE Contact Compatibility** - Optionally force extension to be sent in Contact field of SIP INVITE. This setting is required by **3Com NBX**.

**Force Ringback** - Optionally generates a ringtone for late-offer calls that don't ring.

## - Extra Settings -



The image shows a software interface window titled "Extra Settings". Inside the window, there is a text input field with the placeholder text "Destination Match". Below the input field is a blue button with a white list icon and the text "Hide Advanced".

**Destination Match**- This field is normally left blank. If an expression is entered here, the system will attempt to match the text in this field with the incoming calls “**Destination**” field. Calls that don’t match will be rejected. This is required when working with some PBXs. This field can also be set as a “regular expression” for a dial plan, which is a more complex topic and can be handled by Comrex support.

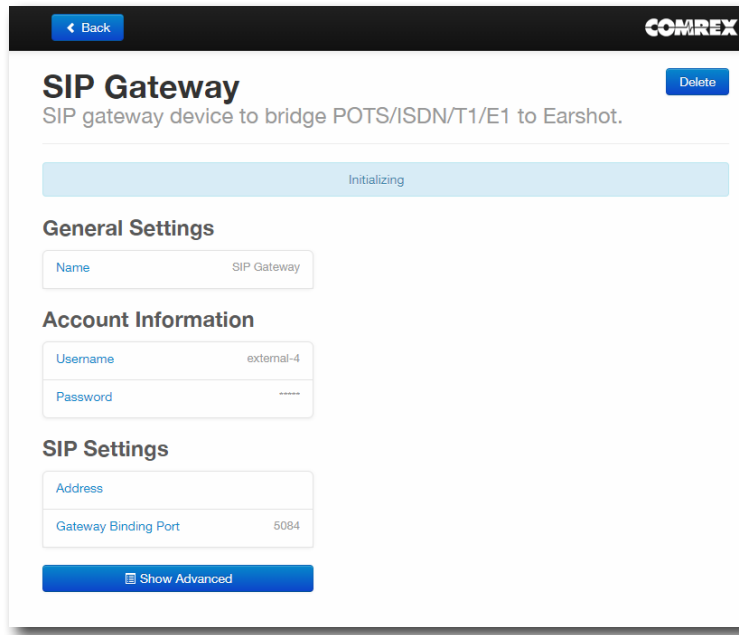
As an example, entering the following value in the field: `^(1\d{3}555210\d)$` Would match the sequence “**1xxx555210x**” where “**x**” is any digit.

## Configuring for a PBX

In the case where you wish to set up incoming lines as extensions of an upstream PBX, the instructions are very similar. Your PBX will deliver channels to EarShot IFB in the same way a SIP provider does, and you will need to set up the PBX and retrieve the proper credentials to program into the SIP Provider fields in EarShot IFB. IP PBX programming is usually very complex and is usually handled by the PBX vendor. Inform the vendor that you wish to set up an incoming only extension with “x” number of simultaneous channels and without additional features like conferencing, transfer, etc. (since EarShot IFB doesn’t support these functions).

## Gateways

Gateways allow you to use EarShot IFB with traditional analog phone lines, as well as T1, BRI and PRI ISDN, and other legacy telephone trunks. Gateways will convert these telephone channels to SIP-style virtual phone lines. You will need to find gateways that deliver FXO style channels on their telco side - the ports on the gateway are designed to point toward the telephone service (and not interface with telephones and PBXs, like an FXS port does). Setup of gateway devices can be quite complex. Comrex maintains some basic instructions on how to set the gateways we prefer on our website [www.comrex.com](http://www.comrex.com). Gateways deliver their virtual SIP lines differently than SIP providers. With gateways, EarShot IFB becomes the “provider” and the gateways register with it. This means the credentials you set up on EarShot IFB will be generated by you, and they will need to be mirrored into the gateway. To use a gateway, both the gateway and the EarShot IFB must have Static IP addresses so they can find each other.



The previous figure shows the settings for gateways (**Line Configuration > VoIP Providers > Add Providers > SIP Gateway Device**). Many of the settings are populated automatically by EarShot IFB, but can be changed to any value you wish.

#### - General Settings -

**Name** - Give your gateway a unique name.

#### - Account Information -

**Username and Password** - Locally generated values that the gateway will use to register to EarShot IFB.

#### - Sip Settings -

**Address** - The IP address of the gateway.

**Gateway Binding Port** - Automatically populated with an unused port. Must be mirrored into the **Gateway Settings**.

## SIP Trunks

With regard to EarShot IFB, we refer to SIP Trunks as provider accounts that don't require registration with a provider's server. These types of services are also referred to as using "IP Authorization" because call authorization is accomplished by sending calls to a specific, fixed IP address at the customer's site. Likewise, outgoing calls are authorized if they come from the customer's static IP address.

In this way, SIP Trunks are simpler on the provider side because there is no username or password associated with the account, and no login procedure. Trunks can be more complex on the EarShot IFB side, because EarShot IFB must have a way to filter incoming calls as being from your provider, and not some random call on your network. If setting up a SIP trunk behind a router or firewall, special port forwarding rules will need to be applied to your network. Your trunking provider often has guides for this process.

You may also come across certain PBXs that must deliver their extensions in this way. In order for EarShot IFB to receive these extensions, a SIP trunk must be created instead of a provider account.

SIP Trunks also differ from normal SIP providers in several ways. Rather than having EarShot IFB “pull” the SIP channel from a provider, a SIP trunking provider will “push” the channel to a specific IP address of the user. This means in order to support SIP trunking you need a public, static IP address, and no other devices can be utilizing the SIP ports at that address.

Unlike normal SIP providers, only a single SIP Trunk is supported on each EarShot IFB mainframe.

The option to add a new SIP Trunk is located in **Line Configuration-> VoIP providers-> Add Provider -> SIP Trunk**. Once a new Trunk is created, there will be no option to create another.

Although the settings menu for SIP trunking appears the same as for a normal provider, only a few of them are meaningful. You should put your trunking provider’s name into the “**name**” field, choose your codec options (see normal provider settings) and set the correct SIP port value (usually **5060**). **Username** and **Password** fields can be ignored.

You’ll also need to populate the **Server/Realm** field in the **Trunk Settings** menu. This will be the IP address (e.g., **74.94.151.151**) of the Trunking provider. Unlike with registered providers, this field should not be populated with a domain name (e.g., **myprovider.com**) but needs the actual IP address of the provider’s server. This is required for matching, as explained below.

Finally, a SIP trunk needs to determine which calls are from your provider, in order to process them to the correct incoming phone line. This is done via a process called “matching”. The simplest form of matching is the default, where the source address of incoming calls will be matched to the value in the **Server/Realm** field, and if correct, the incoming call will be routed to the proper line.

In some circumstances, this setting isn’t correct and needs to be adjusted. You can access the matching settings by clicking **Show Advanced** and looking under the **Extra Settings** section. The two options of interest for trunks are:

- 1 Trunk Incoming Match Parameter** - Selects which field within the incoming call parameters (sent at call setup time by the provider) is used for the match. This can be the **Network Address** (default) or the **Destination Number** field.
- 2 Trunk Incoming Match** - This is the field where you enter the text that will be matched by the system to the incoming call.

If the **Network Address** option is chosen, It’s OK to leave the **Trunk Incoming Match** field blank - this is the default configuration, and the system will use the Server/Realm field entry for the match.

Alternately, you can input a different IP address to be matched, in the case where the source IP of the call is different than the **Server/Realm** entry.

Alternately, if the **Destination Number** selection is chosen, the **Trunk Incoming Match** field must be populated. The system will look at the **Destination Number** field of incoming calls and accept only calls with literal matching text. This field can also be set as a “regular expression” for a dial plan, which is a more complex topic and can be handled by Comrex support. As an example, entering the following value in the field:

```
^(1\d{3}555210\d)$
```

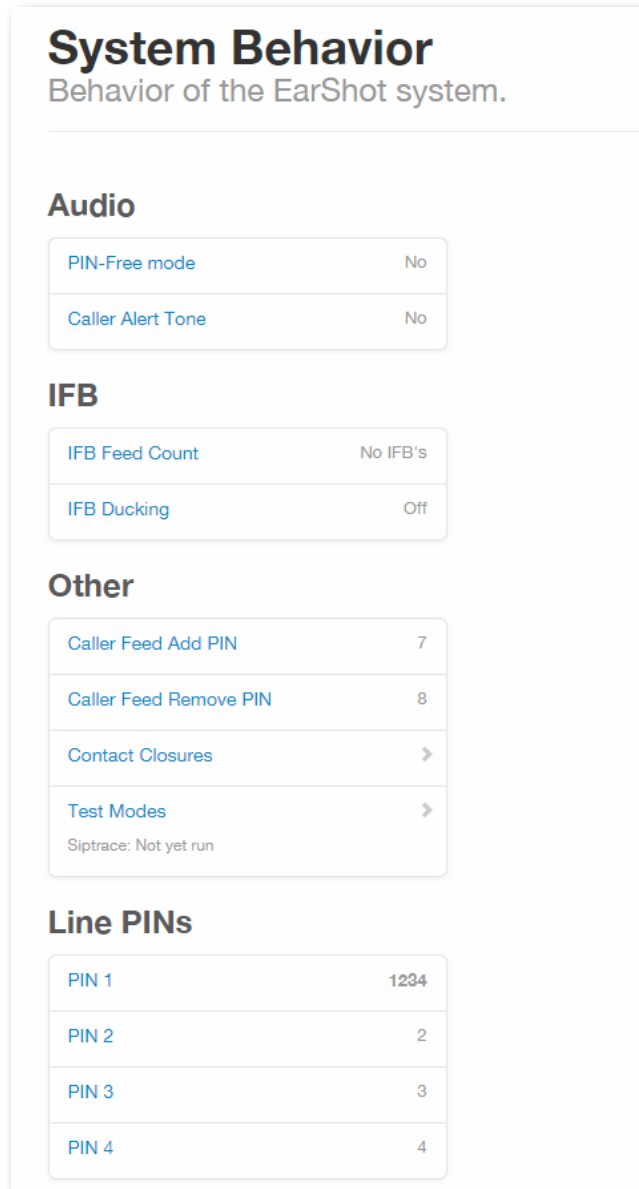
This would match the sequence “**1xxx555210x**” where “**x**” is any digit.

Note, the **Destination Match** field is not used for SIP Trunks. This is used for registered providers only. Putting information in this field for SIP Trunks may result in call failure.

Once created, the status of your SIP trunks will always show as “registered”. In the case of SIP trunks, this status is meaningless, since no actual data has been received from the provider until a call is established.

# VII. System Behavior

Back at the main **Toolbox** page, selecting System Behavior allows you to set how the EarShot IFB reacts to incoming calls. The options are divided into **Audio**, **IFB**, **Other**, and **Line PINs** settings.



**System Behavior**  
Behavior of the EarShot system.

**Audio**

PIN-Free mode	No
Caller Alert Tone	No

**IFB**

IFB Feed Count	No IFB's
IFB Ducking	Off

**Other**

Caller Feed Add PIN	7
Caller Feed Remove PIN	8
Contact Closures	>
Test Modes	>

Siptrace: Not yet run

**Line PINs**

PIN 1	1234
PIN 2	2
PIN 3	3
PIN 4	4

## Audio Settings

**PIN-Free Mode** - In normal operation, incoming callers are parked into the system’s “waiting room” and prompted for a PIN number to select their feed. PIN-Free mode instead parks all callers into Feed 4. It is still possible to change to other Feeds using DTMF control.

**Caller Alert Tone** - Determines if callers receive a short alert tone when entering the “waiting room”.



# IFB settings

**IFB Feed Count** - This function allows use of IFB channels. EarShot IFB has a total of four inputs, which by default are all "Feeds" that can be selected by callers. By engaging IFB, the user will sacrifice one or two of the Feed inputs, and use only the two or three remaining feeds.

Only Feed input #1 and #2 can be changed into IFBs. This means that input #3 and #4 are always dedicated as normal feeds.

## System Behavior

Behavior of the EarShot system.

[Restart System](#)

---

### Audio

PIN-Free mode	No
Caller Alert Tone	No

### IFB

IFB Feed Count	No IFB's
IFB Ducking	Off

### Other

Caller Feed Add PIN	7
Caller Feed Remove PIN	8

### IFB Feed Count

Determines how many feeds will be used for IFB. Up to two feeds may be used as IFB. Feed four is used as the first IFB, and feed three is used as the second.

Default: No IFB's

[Set to Default](#)

No IFB's  
No IFB's  
IFB #1 enabled  
IFB's #1 and #2 enabled

[Cancel](#) [Save Setting](#)

A selection is provided to enable IFB. The choices are:

- 1 No IFB** - (default)
- 2 IFB #1 enabled** - Only Feeds 2-4 are active.
- 3 IFB #1 and #2 enabled** - Only Feeds 3 and 4 are active.

If one or both IFB inputs are enabled, a new option will appear to allow you to select to which feed the IFB is dedicated. If only IFB #1 is enabled, it can be assigned to Feed #2, #3, or #4 (but only one of these). If both IFB #1 and #2 are enabled, each can be assigned to Feed #3 or #4 (but not both).

**IFB Ducking** - IFB works as an audio detector. When audio is present on the IFB input, the level of its corresponding feed is reduced (by the amount in the **IFB Ducking** option) and the IFB audio is sent at normal level. There are no options for manually controlling the IFB function.

## Other Options

**Caller Feed Add PIN** - DTMF sequence that will add a caller's microphone audio to the feed when dialed.

**Caller Feed Remove PIN** - DTMF sequence that will remove a caller's microphone audio to the feed when dialed.

**Contact Closures** - By default, the contact closure outputs are active when any call is active on a particular feed (e.g. a call active on Feed #1 triggers Contact Closure #1). The contact closure for each feed can be changed in the Contact Closure menu.

**Test Modes** - These options are used for diagnostics or demo purposes only and will interfere with normal operation when enabled.

**Audio Test** - These options provide for specific audio paths to be enabled. These are used in unit production tests and can also be used to troubleshoot general hookup issues. Modes are also offered that generate a tone from the caller out ports.

**Contact Closure Test** - Likewise, enabling this option puts the contact closure feature in "loopback" mode with inputs directly driving outputs (e.g., input 1-> output 1 etc).

**SIP Trace** - SIP Trace is a diagnostic tool that allows the user to extract packet captures to help with troubleshooting SIP provider issues.

To perform a SIP Trace, select **Trace Target**. Select All to capture all traffic to and from the EarShot IFB, or select one of your SIP Providers from the drop-down menu to perform a packet capture for one specific provider.

Selecting **All** will provide unfiltered data including broadcast data on your network. There can be a lot of information in this file that may not be necessary. Selecting the individual providers will give you a more precise set of information.

The screenshot displays the 'Test Modes' configuration interface. At the top, there is a 'Back' button and the 'COMREX' logo. The main heading is 'Test Modes' with the subtitle 'Configure and control test modes.' A status bar indicates 'Siptrace: Finished'. Under 'Test Modes', there are two toggle switches: 'Audio Test' and 'Contact Closure Test', both currently set to 'Off (normal ...)'. The 'SIP Trace' section is active, featuring a 'Trace Target' dropdown menu set to 'All'. Below this are 'Start Trace' and 'Download Trace' buttons. A 'Trace Target' dialog box is open, showing a list of providers: 'All', 'SIP Trunk', 'SIP Provider', 'SIP Gateway', and 'SIP Provider'. The 'All' option is selected. The dialog also includes a 'Set to Default' button, a 'Cancel' button, and a 'Save Setting' button.

Press **Save Setting** once selected.

Next, press **Start Trace**.

When you would like to end the capture, simply select **Stop Trace**.

Once pressed, a new button titled **Download Trace** becomes available. Press this to download the packet capture file (a .pcap extension).

This will start an http download to your browser.

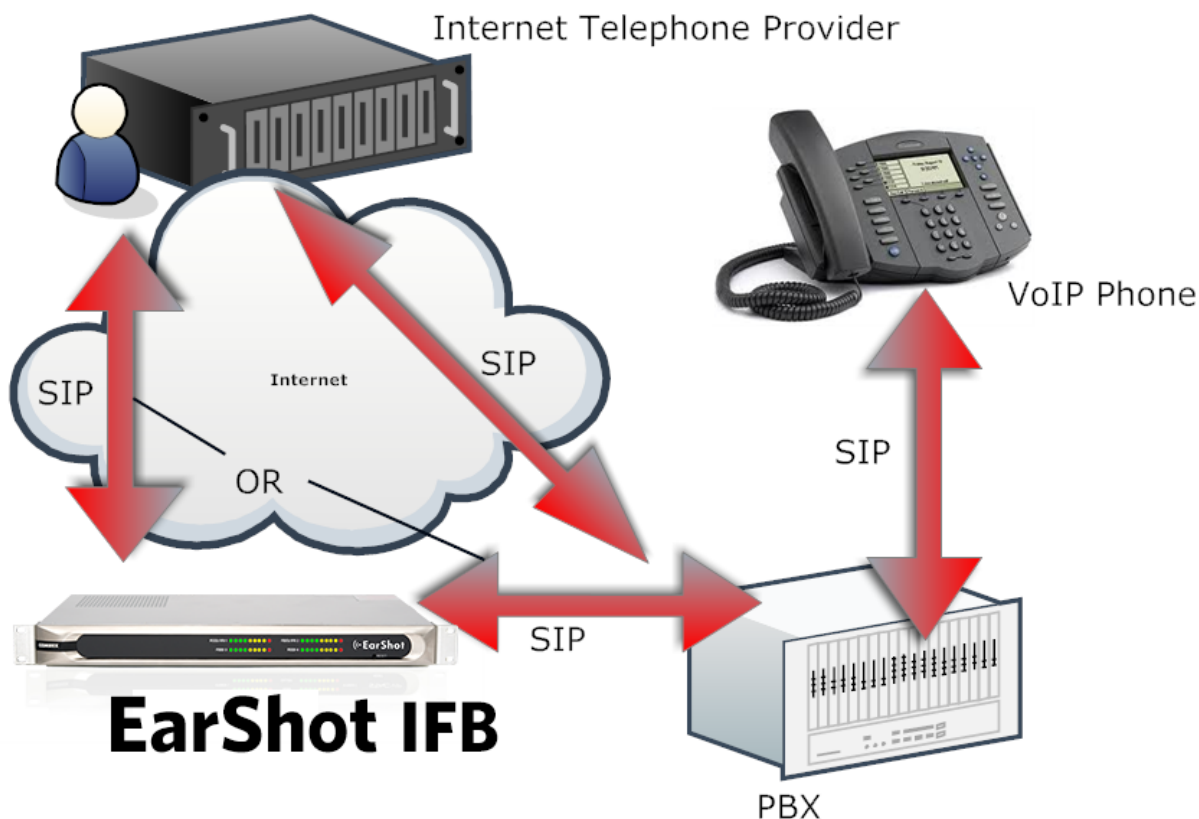
To review this file, we recommend using Wireshark, a free and open source packet analyser available online.

## **PINs**

Callers will select their feeds by inputting DTMF (Touch Tones). The PINs used to select each feed are programmable here. Note that PINs must be followed by the “pound” (#) sign to be engaged. PINs can be up to four digits in length. Default PINs are the single digits 1, 2 etc for each feed.

## VIII. More About SIP

Before we get into a conversation about routers and SIP issues, it's important to understand the basics of how SIP works.

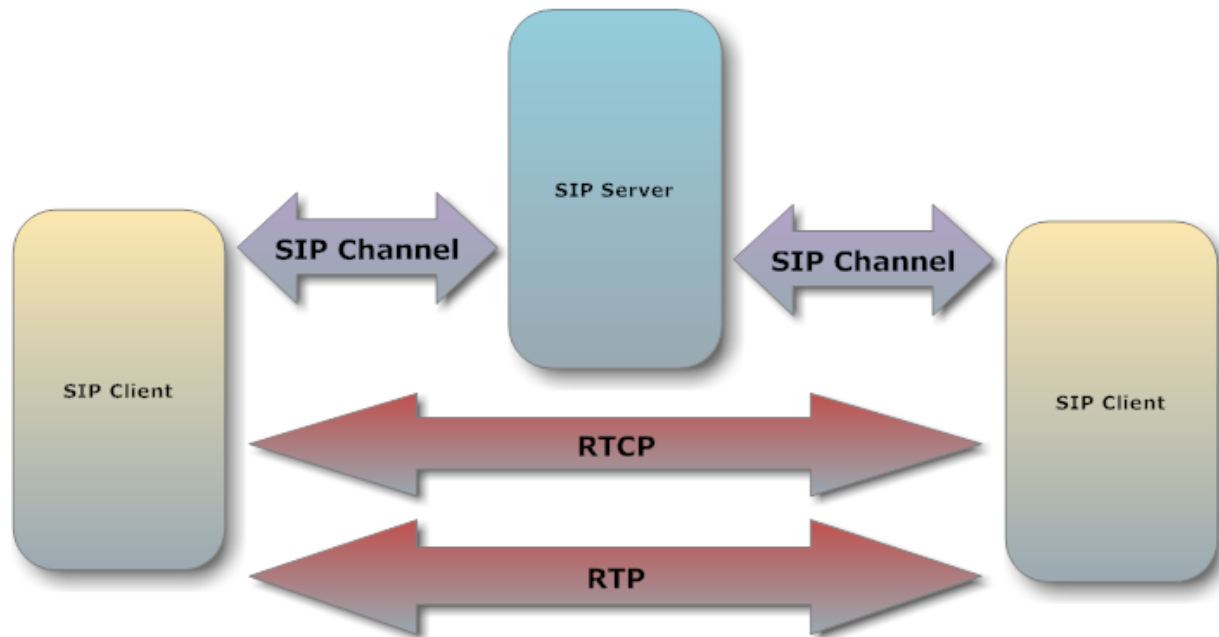


The great thing about SIP is that the same protocol is used between devices along the chain. In our example shown in Figure the figure above, a SIP PBX uses the protocol to register and place and receive calls with a SIP service provider on the Internet. In this scenario, the provider is acting like a SIP host and the PBX is acting like a client.

Further down the chain, the PBX has a similar but inverse relation with its extensions - the PBX in this link is the host and the extensions are the clients.

But in both links, the protocol is the same - the client is registering with the SIP host, the host is notifying the client of incoming calls and handling outbound call routing. The way the clients and hosts are set up is identical.

If in this scenario, you replace the phone extension with an EarShot IFB system, you can see how lines can now be shared between a PBX and your studio telephone system. The EarShot IFB acts like a SIP extension to the PBX. This requires some PBX programming to keep straight, but offers the ultimate in flexibility and utility. Of course, since the protocol is the same, the EarShot IFB can register with the SIP provider directly, bypassing the PBX entirely.



Technically, as shown above, a SIP client opens one channel to its host when it registers. This channel is kept open indefinitely, and uses the TCP transport layer for reliability.

This channel is used by the SIP client to request an outgoing call, as well as by the SIP host to notify the client of incoming calls. The channel is initiated from the client and kept open with keep-alive data so it doesn't have any issue when running through routers that incorporate Network Address Translation (NAT).

This signalling channel doesn't actually carry any voice data, the voice data channel is created separately over distinctly different "ports" on the client, using a protocol called RTP.

## NAT Router issues with SIP

The issues with a SIP client (like EarShot IFB) behind a NAT router are twofold:

- 1 When SIP clients (like EarShot IFB) are behind NAT routers, they don't know their public IP address. The client only knows the private LAN (e.g. 192.168.x.x) address, but not the public IP used by the NAT router on the Internet. During the negotiation process, the client provides information on how other devices can reach it directly. But this information is flawed, since the LAN address is useless to devices outside the LAN.
- 2 **NAT routers don't know what to do with unsolicited incoming RTP streams.** The RTP and RTCP channels that are created as a result of the negotiation over the registration channel for incoming calls are aimed at the router's public IP address and are targeted to temporary or "ephemeral" ports that are chosen during that negotiation.

Issue #1 is usually resolved when using a reputable SIP provider, as they will have the smarts to substitute your public IP address for your private one during the negotiation process.

Note that even when this issue is resolved, the second issue remains - the streams created to the proper address will "bounce" off the router, because the router has no idea where to send them.

**Issue #2** is more complex, but there are some workarounds:

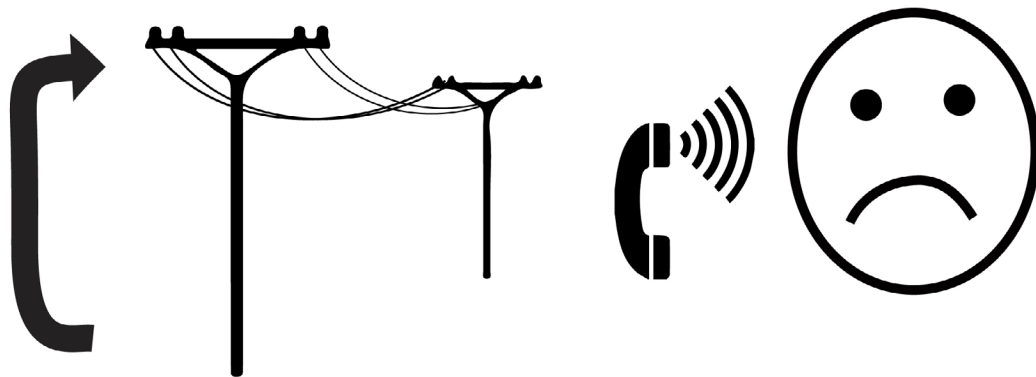
- 1 The simplest way of avoiding NAT issues is not to use NAT at all. If your router supports a DMZ function, this will have the effect of putting your client (EarShot IFB) open to all incoming traffic on the Internet. Alternately, EarShot IFB can be located directly on an open Internet connection with a fixed, public IP programmed into it.
- 2 Many modern routers and firewalls have a feature called SIP ALG that may be either on or off by default. If SIP ALG is designed correctly (and not all implementations are), your router will be smart enough to “sniff” the command SIP channel, predict where incoming RTP streams are expected, and route them to the proper ports on your SIP device. The one magic rule of SIP ALG use is to avoid the use of other workarounds simultaneously - SIP ALG assumes it’s the only one tasked with NAT traversal and will malfunction if other workarounds are employed.
- 3 Use a SIP provider that has implemented their own complete NAT solution. Several providers have systems that have been finely tuned to resolve the NAT issue for RTP streams. They can detect the difference between public and private addressing, and proxy all the media data between the clients if necessary, making NAT traversal much simpler. You can inquire whether your SIP provider implements a “NAT solution” and in particular whether they employ a “media relay”, which means the provider can act as a proxy for your calls.

# IX. Why do I Hear Hear Myself Myself?

---

## Mix-Minus and Eliminating echo

Studio telephone integration is a two-way process. The caller must send his audio to the studio, but also receive a return feed that allows him to interact with other sources, like a host. An important element of voice telephony involves allowing a speaking party to hear his own voice in his own earpiece. This sidetone provides a speaker the comfort of knowing his voice is getting through, and makes two-way communication flow more easily.



But for several reasons, telephone sidetone is always generated locally within the speaker's equipment, rather than on the far end of the call. This is because humans have a very hard time handling even the smallest delay in this sidetone signal. In testing, we find that any delay over around 10mS starts to have an effect called "slapback" where the speaker is unable to maintain conversation and begins to halt and stutter.

Even in “old-fashioned” analog telephone circuits, it’s possible to create a 10mS round-trip delay on a long distance call. Now add in the requirement that modern VoIP-based systems have inherent windowing and buffer delays, and its easy to pile up over 100mS round-trip on a call. A delay of this length will typically not impede interactive conversation, but will certainly create an intolerable “slapback” environment if the caller hears his own voice delayed.

The telephone network employs digital echo cancellers at various nodes along the path of a phone call to avoid this scenario. And when they malfunction or are “untrained” at the start of a call, the effect is a dramatic echo in the caller’s ear.

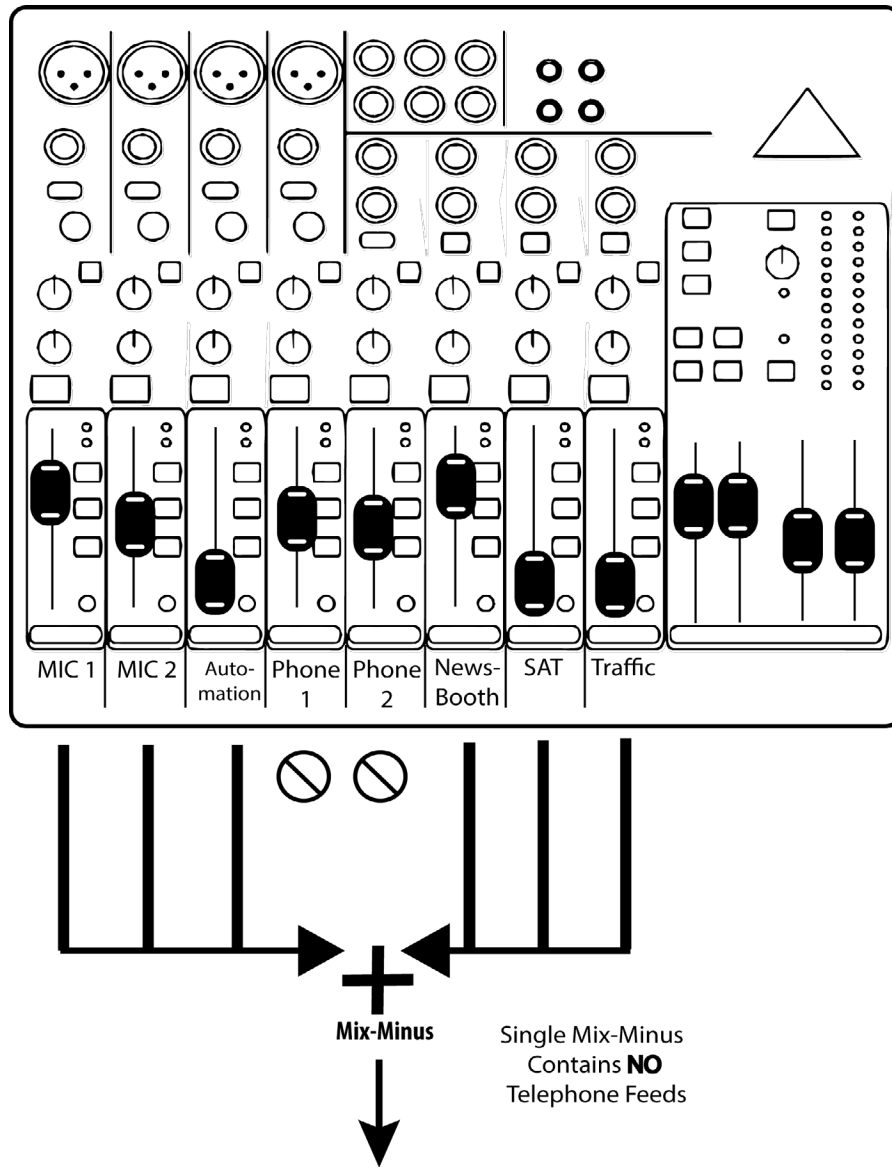
Many users installing a studio-based phone system for the first time make the mistake of applying audio to the outgoing “send’ port that contains the main program feed - the same audio used to feed the transmitter or webstream. Since this mix contains the caller’s own audio, and there’s an inherent delay in modern digital systems, the “slapback” effect is immediate.

The solution here is mix-minus-- a term used for a special mix of audio that explicitly excludes one source--the audio coming from the place the mix-minus is being sent. To put it another way, mix-minus is the entire studio mix minus one audio source.

So how do we create this special audio mix? On modern studio systems, this is usually well defined and easy to do. Many consoles feature channels dedicated to telephone interface, and part of the channel is an automatically-created mix-minus output.

In less full-featured consoles, a mix-minus can often be created with an auxiliary or “audition” bus function. By selecting all relevant incoming sources on the bus except for the telephone fader, you can do this easily. The following figure shows the block diagram of a single mix-minus feed being generated on a mixing console.

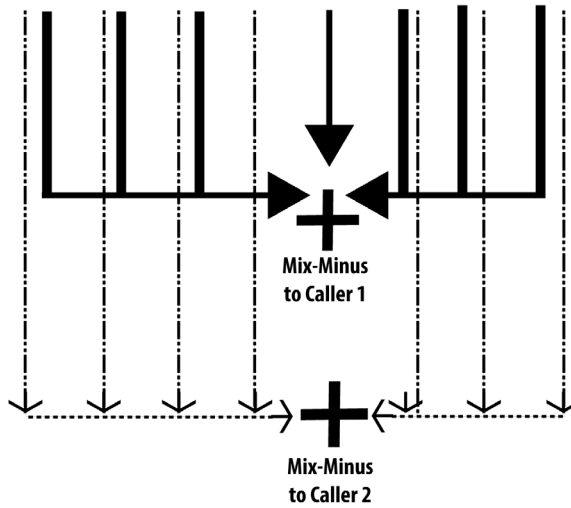
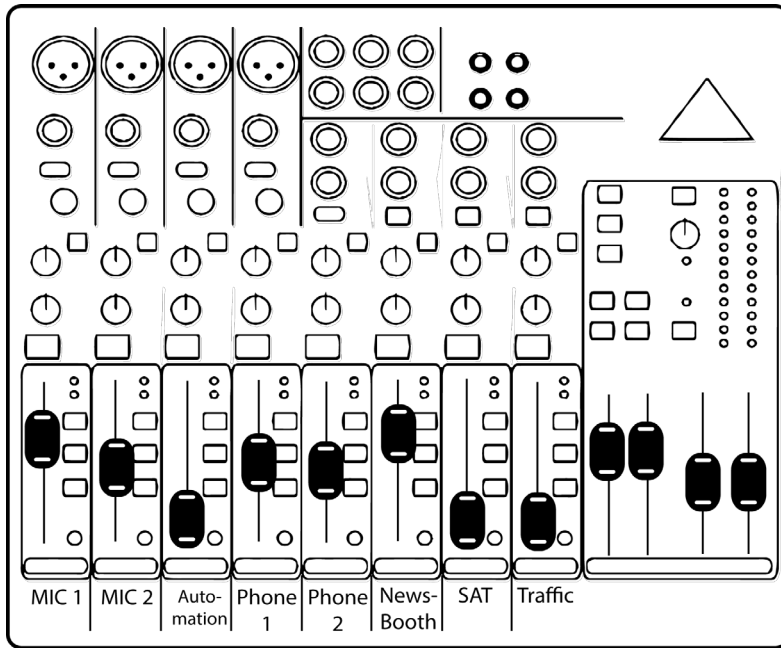




### SINGLE MIX-MINUS NO TELEPHONE FEEDS

In some environments, it's only important that the caller hear the in-studio host, and less urgent that the on-air caller be able to hear automation, news reports, codecs etc. It's possible that simply routing an amplified version of the studio microphone signal to the "send" input will meet those needs.

Some studio telephone systems, like Comrex EarShot IFB, allow telephone callers to appear on one of two outputs (and therefore on two, separate console faders). In this circumstance, you often have a choice of delivering a single mix-minus with neither of the telephone audio sources present, or two distinct mix-minus feeds. In the case of two feeds, it's important to note that mix-minus A must include the caller audio B and vice-versa. The following figure illustrates this concept. Many consoles with dual telephone channels are designed to work this way, and should deliver the correct set of mixes automatically.



**TWO MIX-MINUS FEEDS**

# X. Information for IT Managers

## About EarShot IFB IFB

---

### Mainframe

EarShot IFB mainframe is an embedded Linux-based device with dual 10/100/1000Base-T Ethernet ports. The device contains an optimized version of the Linux kernel (at this writing, 3.12). The IP parameters are set using a GUI that requires attachment of a keyboard and VGA monitor to the device.

Alternately, during the first five minutes of power up, the IP parameters may be set by a PC on the local LAN using a proprietary broadcast UDP protocol. Comrex provides the **Device Manager** software to perform this function on the local PC. After five minutes of operation, this function is disabled.

The device runs several services on different ports, outlined here:

### Incoming Services

The device hosts a combined HTTP/XML service on **TCP 80**. If this service is needed outside the firewall, the port will need to be routed to the mainframe.

Firmware updates to the device are installed using the **Device Manager**. This update process is password protected and done via XML over **TCP port 80**. In addition to the password protection, the update data itself must have a valid cryptographic signature from Comrex, or else it is rejected. In order for the unit to be remotely updated, **TCP port 80** must be forwarded to the device. Alternately, updates can be initiated from any local PC using the **Device Manager** software.

The device can support connection to a SIP trunking service, which would require incoming service on a single UDP SIP port (usually **5060**) and two UDP RTP ports in the range of **16384-16432**.

The device can support connection to a registered SIP service. In this case, the UDP SIP connection will be outgoing and the two UDP RTP ports will be incoming in the range of **16384-16482**.

Typically, SIP services rely on the presence of a SIP ALG within the firewall to open RTP ports.

The device will host a SIP connection to its control surface accessories over **UDP 5070** and RTP streams in the range of **UDP 16384-16482**. Connection to control surfaces outside the LAN subnet is not currently supported.

If Comrex support is required, we may ask for access to the SSH host on the mainframe on **TCP 22**. SSH service is protected by a private keypair which is not delivered to customers. SSH service can be disabled in the setup menu.

## Outgoing Services

As described above, the mainframe will make outgoing connections to register with SIP providers (usually to port **UDP 5060**) combined with incoming and outgoing RTP in the range of **UDP 16384-16432**.

An NTP client is implemented by default to **UDP 123**.

The mainframe syncs by default to a Comrex cloud server at **TCP 8090**. This is currently not required for normal operation.

SIP connection attempts will sometimes make external STUN connections to **UDP 3478**.

# XI. Software Licenses

---

EarShot IFB contains both proprietary and open source software. All proprietary portions are **Copyright © 2012 Comrex Corporation, all rights reserved.**

COMREX CORPORATION

END USER LICENSE AGREEMENT

**IMPORTANT READ CAREFULLY: This End User License Agreement (Agreement) is a legal and binding agreement between you (either an individual or a single entity) and Comrex Corporation (Comrex) for the software contained within this product.**

**WHEN YOU INSTALL AND USE THIS PRODUCT, YOU ARE CONSENTING TO BE BOUND BY AND ARE BECOMING A PARTY TO THIS AGREEMENT. IF YOU DO NOT AGREE TO (OR CANNOT COMPLY WITH) ALL OF THE TERMS OF THIS AGREEMENT, DO NOT INSTALL OR USE THIS PRODUCT.**

**APPROVAL IS NOT A PREREQUISITE TO THE VALIDITY OR ENFORCEABILITY OF THIS AGREEMENT AND NO SOLICITATION OF ANY SUCH WRITTEN APPROVAL BY OR ON BEHALF OF COMREX SHALL BE CONSTRUED AS AN INFERENCE TO THE CONTRARY. IF THESE TERMS ARE CONSIDERED AN OFFER BY COMREX, YOUR ACCEPTANCE IS EXPRESSLY LIMITED TO THESE TERMS.**

Under this Agreement, Comrex offers you use of the proprietary Comrex software contained in this product under the following terms:

## 1. No Warranty.

WITH THE EXCEPTION OF THE GENERAL PRODUCT WARRANTY OFFERED AT THE BEGINNING OF THIS MANUAL COMREX EXPRESSLY DISCLAIMS ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT.

FURTHER, COMREX DOES NOT WARRANT RESULTS OF USE OR THAT THE SOFTWARE IS BUG FREE OR THAT ITS USE WILL BE UNINTERRUPTED. COMREX AND ITS LICENSORS DO NOT AND CANNOT WARRANT THE RESULTS YOU MAY OBTAIN BY USING THE SOFTWARE. THIS DISCLAIMER OF WARRANTY CONSTITUTES AN ESSENTIAL PART OF THIS AGREEMENT.

## 2. Limitation of Liability.

NOTWITHSTANDING ANYTHING ELSE HEREIN, UNDER NO CIRCUMSTANCES AND UNDER NO LEGAL THEORY, INCLUDING, BUT NOT LIMITED TO, TORT, CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE, SHALL COMREX OR ITS LICENSORS BE LIABLE TO YOU OR ANY OTHER PERSON (I) FOR ANY PUNITIVE, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY CHARACTER INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOST PROFITS, LOSS OF GOODWILL, WORK STOPPAGE, ACCURACY OF RESULTS, COMPUTER FAILURE OR MALFUNCTION, OR DAMAGES RESULTING FROM YOUR USE OF THE SOFTWARE OR THE SERVICES PROVIDED BY OR ON BEHALF OF COMREX, OR (II) FOR ANY MATTER BEYOND COMREX'S OR ITS LICENSORS REASONABLE CONTROL. COMREX AND ITS LICENSORS MAXIMUM LIABILITY FOR DAMAGES OF ANY KIND WHATSOEVER ARISING OUT OF THIS AGREEMENT SHALL BE LIMITED TO THE PURCHASE PRICE PAID BY YOU FOR THE SOFTWARE, EXCEPT WHERE NOT PERMITTED BY APPLICABLE LAW, IN WHICH CASE COMREX'S LIABILITY SHALL BE LIMITED TO THE MINIMUM AMOUNT PERMITTED BY SUCH APPLICABLE LAW. THE FOREGOING LIMITATIONS SHALL APPLY EVEN IF COMREX HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES.

## 3. Indemnity.

You shall indemnify and hold harmless Comrex and its licensors from any third party claims, damages, liabilities, costs and fees (including reasonable attorney fees) arising from Your use of the Software as well as from Your failure to comply with any term of this Agreement.

## 4. General.

This Agreement represents the complete agreement concerning this license between the parties and supersedes all prior agreements and representations between them. This Agreement may be amended only by a writing executed by both parties. If any provision of this Agreement is held to be illegal or unenforceable, that provision shall be limited or eliminated to the minimum extent necessary to make it legal and enforceable and this Agreement shall otherwise remain in full force and effect and enforceable. The failure of Comrex to act with respect to a breach of this Agreement by You or others does not constitute a waiver and shall not limit Comrex's rights with respect to such breach or any subsequent breaches. This Agreement shall be governed by and construed under Massachusetts law (without regard to its conflicts of laws provisions) as such law applies to agreements between Massachusetts residents entered into and to be performed within Massachusetts. The sole and exclusive jurisdiction and venue for actions arising under this Agreement shall be the State and Federal courts in Worcester County, Massachusetts; You hereby agree to service of process in accordance with the rules of such courts. The party prevailing in any dispute under this Agreement shall be entitled to its costs and legal fees.

Questions concerning this Agreement should be sent to the address set forth below. Any notices or correspondences will only be effective if sent to such address.

**Comrex Corporation  
19 Pine Road  
Devens, MA 01434**

Open source software used in STAC VIP is protected under a wide variety of licenses, listed below.

# GNU Public License Version 2

linux  
module-init-tools  
udev  
e2fsprogs  
busybox  
bash  
tcpdump  
alsa-utils  
ethtool  
acpid  
usbutils  
procps  
fxload

## GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.

51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

### Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Lesser General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

## GNU GENERAL PUBLIC LICENSE

### TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

- a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

#### **NO WARRANTY**

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

#### **END OF TERMS AND CONDITIONS**

##### How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.

one line to give the program’s name and an idea of what it does.  
Copyright (C) yyyy name of author

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA.

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) year name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details  
type `show w`. This is free software, and you are welcome  
to redistribute it under certain conditions; type `show c`  
for details.

The hypothetical commands `show w` and `show c` should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w` and `show c`; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the program, if necessary. Here is a sample; alter the names:



Yoyodyne, Inc., hereby disclaims all copyright interest in the program 'Gnomovision' (which makes passes at compilers) written by James Hacker.

signature of Ty Coon, 1 April 1989  
Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License.

## GNU Public License Version 3

m4  
gnupg  
dosfstools

Copyright © 2007 Free Software Foundation, Inc. <<http://fsf.org/>>

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

### Preamble

The GNU General Public License is a free, copyleft license for software and other kinds of works.

The licenses for most software and other practical works are designed to take away your freedom to share and change the works. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. We, the Free Software Foundation, use the GNU General Public License for most of our software; it applies also to any other work released this way by its authors. You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps:

- (1) assert copyright on the software, and
- (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

### TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To “propagate” a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To “convey” a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays “Appropriate Legal Notices” to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

#### 1. Source Code.

The “source code” for a work means the preferred form of the work for making modifications to it. “Object code” means any non-source form of a work.

A “Standard Interface” means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The “System Libraries” of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A “Major Component”, in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The “Corresponding Source” for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work’s System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

#### 2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

You may make, run and propagate covered works that you do not convey, without conditions so long as your license otherwise remains in force. You may convey covered works to others for the sole purpose of having them make modifications exclusively for you, or provide you with facilities for running those works, provided that you comply with the terms of this License in conveying all material for which you do not control copyright. Those thus making or running the covered works for you must do so exclusively on your behalf, under your direction and control, on terms that prohibit them from making any copies of your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

#### 3. Protecting Users’ Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work’s users, your or third parties’ legal rights to forbid circumvention of technological measures.

#### 4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program’s source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

#### 5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

- a) The work must carry prominent notices stating that you modified it, and giving a relevant date.
- b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to “keep intact all notices”.

- c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.
- d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

## 6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

- a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.
- b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.
- c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.
- d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.
- e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

## 7. Additional Terms.

"Additional permissions" are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law. If additional permissions apply only to part of the Program, that part may be used separately under those permissions, but the entire Program remains governed by this License without regard to the additional permissions.

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.) You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.

Notwithstanding any other provision of this License, for material you add to a covered work, you may (if authorized by the copyright holders of that material) supplement the terms of this License with terms:

- a) Disclaiming warranty or limiting liability differently from the terms of sections 15 and 16 of this License; or
- b) Requiring preservation of specified reasonable legal notices or author attributions in that material or in the Appropriate Legal Notices displayed by works containing it; or

- c) Prohibiting misrepresentation of the origin of that material, or requiring that modified versions of such material be marked in reasonable ways as different from the original version; or
- d) Limiting the use for publicity purposes of names of licensors or authors of the material; or
- e) Declining to grant rights under trademark law for use of some trade names, trademarks, or service marks; or
- f) Requiring indemnification of licensors and authors of that material by anyone who conveys the material (or modified versions of it) with contractual assumptions of liability to the recipient, for any liability that these contractual assumptions directly impose on those licensors and authors.

All other non-permissive additional terms are considered “further restrictions” within the meaning of section 10. If the Program as you received it, or any part of it, contains a notice stating that it is governed by this License along with a term that is a further restriction, you may remove that term. If a license document contains a further restriction but permits relicensing or conveying under this License, you may add to a covered work material governed by the terms of that license document, provided that the further restriction does not survive such relicensing or conveying.

If you add terms to a covered work in accord with this section, you must place, in the relevant source files, a statement of the additional terms that apply to those files, or a notice indicating where to find the applicable terms.

Additional terms, permissive or non-permissive, may be stated in the form of a separately written license, or stated as exceptions; the above requirements apply either way.

#### 8. Termination.

You may not propagate or modify a covered work except as expressly provided under this License. Any attempt otherwise to propagate or modify it is void, and will automatically terminate your rights under this License (including any patent licenses granted under the third paragraph of section 11).

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, you do not qualify to receive new licenses for the same material under section 10.

#### 9. Acceptance Not Required for Having Copies.

You are not required to accept this License in order to receive or run a copy of the Program. Ancillary propagation of a covered work occurring solely as a consequence of using peer-to-peer transmission to receive a copy likewise does not require acceptance. However, nothing other than this License grants you permission to propagate or modify any covered work. These actions infringe copyright if you do not accept this License. Therefore, by modifying or propagating a covered work, you indicate your acceptance of this License to do so.

#### 10. Automatic Licensing of Downstream Recipients.

Each time you convey a covered work, the recipient automatically receives a license from the original licensors, to run, modify and propagate that work, subject to this License. You are not responsible for enforcing compliance by third parties with this License.

An “entity transaction” is a transaction transferring control of an organization, or substantially all assets of one, or subdividing an organization, or merging organizations. If propagation of a covered work results from an entity transaction, each party to that transaction who receives a copy of the work also receives whatever licenses to the work the party’s predecessor in interest had or could give under the previous paragraph, plus a right to possession of the Corresponding Source of the work from the predecessor in interest, if the predecessor has it or can get it with reasonable efforts.

You may not impose any further restrictions on the exercise of the rights granted or affirmed under this License. For example, you may not impose a license fee, royalty, or other charge for exercise of rights granted under this License, and you may not initiate litigation (including a cross-claim or counterclaim in a lawsuit) alleging that any patent claim is infringed by making, using, selling, offering for sale, or importing the Program or any portion of it.

#### 11. Patents.

A “contributor” is a copyright holder who authorizes use under this License of the Program or a work on which the Program is based. The work thus licensed is called the contributor’s “contributor version”.

A contributor’s “essential patent claims” are all patent claims owned or controlled by the contributor, whether already acquired or hereafter acquired, that would be infringed by some manner, permitted by this License, of making, using, or selling its contributor version, but do not include claims that would be infringed only as a consequence of further modification of the contributor version. For purposes of this definition, “control” includes the right to grant patent sublicenses in a manner consistent with the requirements of this License.

Each contributor grants you a non-exclusive, worldwide, royalty-free patent license under the contributor’s essential patent claims, to make, use, sell, offer for sale, import and otherwise run, modify and propagate the contents of its contributor version.

In the following three paragraphs, a “patent license” is any express agreement or commitment, however denominated, not to enforce a patent (such as an express permission to practice a patent or covenant not to sue for patent infringement). To “grant” such a patent license to a party means to make such an agreement or commitment not to enforce a patent against the party.

If you convey a covered work, knowingly relying on a patent license, and the Corresponding Source of the work is not available for anyone to copy, free of charge and under the terms of this License, through a publicly available network server or other readily accessible means, then you must either (1) cause the Corresponding Source to be so available, or (2) arrange to deprive yourself of the benefit of the patent license for this particular work, or (3) arrange, in a manner consistent with the requirements of this License, to extend the patent license to downstream recipients. “Knowingly relying” means you have actual

knowledge that, but for the patent license, your conveying the covered work in a country, or your recipient's use of the covered work in a country, would infringe one or more identifiable patents in that country that you have reason to believe are valid.

If, pursuant to or in connection with a single transaction or arrangement, you convey, or propagate by procuring conveyance of, a covered work, and grant a patent license to some of the parties receiving the covered work authorizing them to use, propagate, modify or convey a specific copy of the covered work, then the patent license you grant is automatically extended to all recipients of the covered work and works based on it.

A patent license is "discriminatory" if it does not include within the scope of its coverage, prohibits the exercise of, or is conditioned on the non-exercise of one or more of the rights that are specifically granted under this License. You may not convey a covered work if you are a party to an arrangement with a third party that is in the business of distributing software, under which you make payment to the third party based on the extent of your activity of conveying the work, and under which the third party grants, to any of the parties who would receive the covered work from you, a discriminatory patent license (a) in connection with copies of the covered work conveyed by you (or copies made from those copies), or (b) primarily for and in connection with specific products or compilations that contain the covered work, unless you entered into that arrangement, or that patent license was granted, prior to 28 March 2007.

Nothing in this License shall be construed as excluding or limiting any implied license or other defenses to infringement that may otherwise be available to you under applicable patent law.

#### 12. No Surrender of Others' Freedom.

If conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot convey a covered work so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not convey it at all. For example, if you agree to terms that obligate you to collect a royalty for further conveying from those to whom you convey the Program, the only way you could satisfy both those terms and this License would be to refrain entirely from conveying the Program.

#### 13. Use with the GNU Affero General Public License.

Notwithstanding any other provision of this License, you have permission to link or combine any covered work with a work licensed under version 3 of the GNU Affero General Public License into a single combined work, and to convey the resulting work. The terms of this License will continue to apply to the part which is the covered work, but the special requirements of the GNU Affero General Public License, section 13, concerning interaction through a network will apply to the combination as such.

#### 14. Revised Versions of this License.

The Free Software Foundation may publish revised and/or new versions of the GNU General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies that a certain numbered version of the GNU General Public License "or any later version" applies to it, you have the option of following the terms and conditions either of that numbered version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of the GNU General Public License, you may choose any version ever published by the Free Software Foundation.

If the Program specifies that a proxy can decide which future versions of the GNU General Public License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Program.

Later license versions may give you additional or different permissions. However, no additional obligations are imposed on any author or copyright holder as a result of your choosing to follow a later version.

#### 15. Disclaimer of Warranty.

THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

#### 16. Limitation of Liability.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

#### 17. Interpretation of Sections 15 and 16.

If the disclaimer of warranty and limitation of liability provided above cannot be given local legal effect according to their terms, reviewing courts shall apply local law that most closely approximates an absolute waiver of all civil liability in connection with the Program, unless a warranty or assumption of liability accompanies a copy of the Program in return for a fee.

### END OF TERMS AND CONDITIONS

#### How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively state the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

This program is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program. If not, see <http://www.gnu.org/licenses/>.

Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

```
<program> Copyright (C) <year> <name of author>
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an “about box”.

You should also get your employer (if you work as a programmer) or school, if any, to sign a “copyright disclaimer” for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see <http://www.gnu.org/licenses/>.

The GNU General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License. But first, please read <http://www.gnu.org/philosophy/why-not-lgpl.html>.

## Lesser GNU Public License Version 2.1

```
sysfsutils
qt
```

### GNU LESSER GENERAL PUBLIC LICENSE

Version 2.1, February 1999  
Copyright (C) 1991, 1999 Free Software Foundation, Inc.  
51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA  
Everyone is permitted to copy and distribute verbatim copies  
of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts  
as the successor of the GNU Library Public License, version 2, hence  
the version number 2.1.]

#### Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages—typically libraries—of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

#### **TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION**

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a “work that uses the Library”. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a “work that uses the Library” with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a “work that uses the library”. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a “work that uses the Library” uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a “work that uses the Library” with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer’s own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable “work that uses the Library”, as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user’s computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.



For an executable, the required form of the “work that uses the Library” must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients’ exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

#### **NO WARRANTY**

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

## END OF TERMS AND CONDITIONS

### How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.

one line to give the library’s name and an idea of what it does.  
Copyright (C) year name of author

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.

You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the library, if necessary. Here is a sample; alter the names: Yoyodyne, Inc., hereby disclaims all copyright interest in the library ‘Frob’ (a library for tweaking knobs) written by James Random Hacker.

signature of Ty Coon, 1 April 1990  
Ty Coon, President of Vice

That’s all there is to it!

## Mozilla Public License Version 1.1

freeswitch

### 1. Definitions.

1.0.1. “Commercial Use” means distribution or otherwise making the Covered Code available to a third party.

1.1. “Contributor” means each entity that creates or contributes to the creation of Modifications.

1.2. “Contributor Version” means the combination of the Original Code, prior Modifications used by a Contributor, and the Modifications made by that particular Contributor.

1.3. “Covered Code” means the Original Code or Modifications or the combination of the Original Code and Modifications, in each case including portions thereof.

1.4. “Electronic Distribution Mechanism” means a mechanism generally accepted in the software development community for the electronic transfer of data.

1.5. “Executable” means Covered Code in any form other than Source Code.

1.6. “Initial Developer” means the individual or entity identified as the Initial Developer in the Source Code notice required by Exhibit A.

1.7. “Larger Work” means a work which combines Covered Code or portions thereof with code not governed by the terms of this License.

1.8. “License” means this document.

1.8.1. “Licensable” means having the right to grant, to the maximum extent possible, whether at the time of the initial grant or subsequently acquired, any and all of the rights conveyed herein. 1.9. “Modifications” means any addition to or deletion from the substance or structure of either the Original Code or any previous Modifications. When Covered Code is released as a series of files, a Modification is:

a. Any addition to or deletion from the contents of a file containing Original Code or previous Modifications.

b. Any new file that contains any part of the Original Code or previous Modifications.

1.10. “Original Code” means Source Code of computer software code which is described in the Source Code notice required by Exhibit A as Original Code, and which, at the time of its release under this License is not already Covered Code governed by this License.

1.10.1. “Patent Claims” means any patent claim(s), now owned or hereafter acquired, including without limitation, method, process, and apparatus claims, in any patent Licensable by grantor.

1.11. "Source Code" means the preferred form of the Covered Code for making modifications to it, including all modules it contains, plus any associated interface definition files, scripts used to control compilation and installation of an Executable, or source code differential comparisons against either the Original Code or another well known, available Covered Code of the Contributor's choice. The Source Code can be in a compressed or archival form, provided the appropriate decompression or de-archiving software is widely available for no charge.

1.12. "You" (or "Your") means an individual or a legal entity exercising rights under, and complying with all of the terms of, this License or a future version of this License issued under Section 6.1. For legal entities, "You" includes any entity which controls, is controlled by, or is under common control with You. For purposes of this definition, "control" means

- (a) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or
- (b) ownership of more than fifty percent (50%) of the outstanding shares or beneficial ownership of such entity.

## 2. Source Code License.

### 2.1. The Initial Developer Grant.

The Initial Developer hereby grants You a world-wide, royalty-free, non-exclusive license, subject to third party intellectual property claims:

- a. under intellectual property rights (other than patent or trademark) Licensable by Initial Developer to use, reproduce, modify, display, perform, sublicense and distribute the Original Code (or portions thereof) with or without Modifications, and/or as part of a Larger Work; and
- b. under Patents Claims infringed by the making, using or selling of Original Code, to make, have made, use, practice, sell, and offer for sale, and/or otherwise dispose of the Original Code (or portions thereof).
- c. the licenses granted in this Section 2.1 (a) and (b) are effective on the date Initial Developer first distributes Original Code under the terms of this License.
- d. Notwithstanding Section 2.1 (b) above, no patent license is granted: 1) for code that You delete from the Original Code; 2) separate from the Original Code; or 3) for infringements caused by: i) the modification of the Original Code or ii) the combination of the Original Code with other software or devices.

### 2.2. Contributor Grant.

Subject to third party intellectual property claims, each Contributor hereby grants You a world-wide, royalty-free, non-exclusive license

- a. under intellectual property rights (other than patent or trademark) Licensable by Contributor, to use, reproduce, modify, display, perform, sublicense and distribute the Modifications created by such Contributor (or portions thereof) either on an unmodified basis, with other Modifications, as Covered Code and/or as part of a Larger Work; and
- b. under Patent Claims infringed by the making, using, or selling of Modifications made by that Contributor either alone and/or in combination with its Contributor Version (or portions of such combination), to make, use, sell, offer for sale, have made, and/or otherwise dispose of: 1) Modifications made by that Contributor (or portions thereof); and 2) the combination of Modifications made by that Contributor with its Contributor Version (or portions of such combination).
- c. the licenses granted in Sections 2.2 (a) and 2.2 (b) are effective on the date Contributor first makes Commercial Use of the Covered Code.
- d. Notwithstanding Section 2.2 (b) above, no patent license is granted: 1) for any code that Contributor has deleted from the Contributor Version; 2) separate from the Contributor Version; 3) for infringements caused by: i) third party modifications of Contributor Version or ii) the combination of Modifications made by that Contributor with other software (except as part of the Contributor Version) or other devices; or 4) under Patent Claims infringed by Covered Code in the absence of Modifications made by that Contributor.

## 3. Distribution Obligations.

### 3.1. Application of License.

The Modifications which You create or to which You contribute are governed by the terms of this License, including without limitation Section 2.2. The Source Code version of Covered Code may be distributed only under the terms of this License or a future version of this License released under Section 6.1, and You must include a copy of this License with every copy of the Source Code You distribute. You may not offer or impose any terms on any Source Code version that alters or restricts the applicable version of this License or the recipients' rights hereunder. However, You may include an additional document offering the additional rights described in Section 3.5.

### 3.2. Availability of Source Code.

Any Modification which You create or to which You contribute must be made available in Source Code form under the terms of this License either on the same media as an Executable version or via an accepted Electronic Distribution Mechanism to anyone to whom you made an Executable version available; and if made available via Electronic Distribution Mechanism, must remain available for at least twelve (12) months after the date it initially became available, or at least six (6) months after a subsequent version of that particular Modification has been made available to such recipients. You are responsible for ensuring that the Source Code version remains available even if the Electronic Distribution Mechanism is maintained by a third party.

### 3.3. Description of Modifications.

You must cause all Covered Code to which You contribute to contain a file documenting the changes You made to create that Covered Code and the date of any change. You must include a prominent statement that the Modification is derived, directly or indirectly, from Original Code provided by the Initial Developer and including the name of the Initial Developer in (a) the Source Code, and (b) in any notice in an Executable version or related documentation in which You describe the origin or ownership of the Covered Code.

### 3.4. Intellectual Property Matters

#### (a) Third Party Claims

If Contributor has knowledge that a license under a third party's intellectual property rights is required to exercise the rights granted by such Contributor under Sections 2.1 or 2.2, Contributor must include a text file with the Source Code distribution titled "LEGAL" which describes the claim and the party making the claim in sufficient detail that a recipient will know whom to contact. If Contributor obtains such knowledge after the Modification is made available as described in Section 3.2, Contributor shall promptly modify the LEGAL file in all copies Contributor makes available thereafter and shall take other steps (such as notifying appropriate mailing lists or newsgroups) reasonably calculated to inform those who received the Covered Code that new knowledge has been obtained.

#### (b) Contributor APIs

If Contributor's Modifications include an application programming interface and Contributor has knowledge of patent licenses which are reasonably necessary to implement that API, Contributor must also include this information in the legal file.

#### (c) Representations.

Contributor represents that, except as disclosed pursuant to Section 3.4 (a) above, Contributor believes that Contributor's Modifications are Contributor's original creation(s) and/or Contributor has sufficient rights to grant the rights conveyed by this License.

#### 3.5. Required Notices.

You must duplicate the notice in Exhibit A in each file of the Source Code. If it is not possible to put such notice in a particular Source Code file due to its structure, then You must include such notice in a location (such as a relevant directory) where a user would be likely to look for such a notice. If You created one or more Modification(s) You may add your name as a Contributor to the notice described in Exhibit A. You must also duplicate this License in any documentation for the Source Code where You describe recipients' rights or ownership rights relating to Covered Code. You may choose to offer, and to charge a fee for, warranty, support, indemnity or liability obligations to one or more recipients of Covered Code. However, You may do so only on Your own behalf, and not on behalf of the Initial Developer or any Contributor. You must make it absolutely clear than any such warranty, support, indemnity or liability obligation is offered by You alone, and You hereby agree to indemnify the Initial Developer and every Contributor for any liability incurred by the Initial Developer or such Contributor as a result of warranty, support, indemnity or liability terms You offer.

#### 3.6. Distribution of Executable Versions.

You may distribute Covered Code in Executable form only if the requirements of Sections 3.1, 3.2, 3.3, 3.4 and 3.5 have been met for that Covered Code, and if You include a notice stating that the Source Code version of the Covered Code is available under the terms of this License, including a description of how and where You have fulfilled the obligations of Section 3.2. The notice must be conspicuously included in any notice in an Executable version, related documentation or collateral in which You describe recipients' rights relating to the Covered Code. You may distribute the Executable version of Covered Code or ownership rights under a license of Your choice, which may contain terms different from this License, provided that You are in compliance with the terms of this License and that the license for the Executable version does not attempt to limit or alter the recipient's rights in the Source Code version from the rights set forth in this License. If You distribute the Executable version under a different license You must make it absolutely clear that any terms which differ from this License are offered by You alone, not by the Initial Developer or any Contributor. You hereby agree to indemnify the Initial Developer and every Contributor for any liability incurred by the Initial Developer or such Contributor as a result of any such terms You offer.

#### 3.7. Larger Works.

You may create a Larger Work by combining Covered Code with other code not governed by the terms of this License and distribute the Larger Work as a single product. In such a case, You must make sure the requirements of this License are fulfilled for the Covered Code.

#### 4. Inability to Comply Due to Statute or Regulation.

If it is impossible for You to comply with any of the terms of this License with respect to some or all of the Covered Code due to statute, judicial order, or regulation then You must: (a) comply with the terms of this License to the maximum extent possible; and (b) describe the limitations and the code they affect. Such description must be included in the legal file described in Section 3.4 and must be included with all distributions of the Source Code. Except to the extent prohibited by statute or regulation, such description must be sufficiently detailed for a recipient of ordinary skill to be able to understand it.

#### 5. Application of this License.

This License applies to code to which the Initial Developer has attached the notice in Exhibit A and to related Covered Code.

#### 6. Versions of the License.

##### 6.1. New Versions

Netscape Communications Corporation ("Netscape") may publish revised and/or new versions of the License from time to time. Each version will be given a distinguishing version number.

##### 6.2. Effect of New Versions

Once Covered Code has been published under a particular version of the License, You may always continue to use it under the terms of that version. You may also choose to use such Covered Code under the terms of any subsequent version of the License published by Netscape. No one other than Netscape has the right to modify the terms applicable to Covered Code created under this License.

##### 6.3. Derivative Works

If You create or use a modified version of this License (which you may only do in order to apply it to code which is not already Covered Code governed by this License), You must (a) rename Your license so that the phrases "Mozilla", "MOZILLAPL", "MOZPL", "Netscape", "MPL", "NPL" or any confusingly similar phrase do not appear in your license (except to note that your license differs from this License) and (b) otherwise make it clear that Your version of the

license contains terms which differ from the Mozilla Public License and Netscape Public License. (Filling in the name of the Initial Developer, Original Code or Contributor in the notice described in Exhibit A shall not of themselves be deemed to be modifications of this License.)

## 7. Disclaimer of warranty

Covered code is provided under this license on an “as is” basis, without warranty of any kind, either expressed or implied, including, without limitation, warranties that the covered code is free of defects, merchantable, fit for a particular purpose or non-infringing. The entire risk as to the quality and performance of the covered code is with you. Should any covered code prove defective in any respect, you (not the initial developer or any other contributor) assume the cost of any necessary servicing, repair or correction. This disclaimer of warranty constitutes an essential part of this license. No use of any covered code is authorized hereunder except under this disclaimer.

## 8. Termination

8.1. This License and the rights granted hereunder will terminate automatically if You fail to comply with terms herein and fail to cure such breach within 30 days of becoming aware of the breach. All sublicenses to the Covered Code which are properly granted shall survive any termination of this License. Provisions which, by their nature, must remain in effect beyond the termination of this License shall survive.

8.2. If You initiate litigation by asserting a patent infringement claim (excluding declaratory judgment actions) against Initial Developer or a Contributor (the Initial Developer or Contributor against whom You file such action is referred to as “Participant”) alleging that:

a. such Participant’s Contributor Version directly or indirectly infringes any patent, then any and all rights granted by such Participant to You under Sections 2.1 and/or 2.2 of this License shall, upon 60 days notice from Participant terminate prospectively, unless if within 60 days after receipt of notice You either: (i) agree in writing to pay Participant a mutually agreeable reasonable royalty for Your past and future use of Modifications made by such Participant, or (ii) withdraw Your litigation claim with respect to the Contributor Version against such Participant. If within 60 days of notice, a reasonable royalty and payment arrangement are not mutually agreed upon in writing by the parties or the litigation claim is not withdrawn, the rights granted by Participant to You under Sections 2.1 and/or 2.2 automatically terminate at the expiration of the 60 day notice period specified above.

b. any software, hardware, or device, other than such Participant’s Contributor Version, directly or indirectly infringes any patent, then any rights granted to You by such Participant under Sections 2.1(b) and 2.2(b) are revoked effective as of the date You first made, used, sold, distributed, or had made, Modifications made by that Participant.

8.3. If You assert a patent infringement claim against Participant alleging that such Participant’s Contributor Version directly or indirectly infringes any patent where such claim is resolved (such as by license or settlement) prior to the initiation of patent infringement litigation, then the reasonable value of the licenses granted by such Participant under Sections 2.1 or 2.2 shall be taken into account in determining the amount or value of any payment or license.

8.4. In the event of termination under Sections 8.1 or 8.2 above, all end user license agreements (excluding distributors and resellers) which have been validly granted by You or any distributor hereunder prior to termination shall survive termination.

## 9. Limitation of liability

Under no circumstances and under no legal theory, whether tort (including negligence), contract, or otherwise, shall you, the initial developer, any other contributor, or any distributor of covered code, or any supplier of any of such parties, be liable to any person for any indirect, special, incidental, or consequential damages of any character including, without limitation, damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses, even if such party shall have been informed of the possibility of such damages. This limitation of liability shall not apply to liability for death or personal injury resulting from such party’s negligence to the extent applicable law prohibits such limitation. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion and limitation may not apply to you.

## 10. U.S. government end users

The Covered Code is a “commercial item,” as that term is defined in 48 C.F.R. 2.101 (Oct. 1995), consisting of “commercial computer software” and “commercial computer software documentation,” as such terms are used in 48 C.F.R. 12.212 (Sept. 1995). Consistent with 48 C.F.R. 12.212 and 48 C.F.R. 227.7202-1 through 227.7202-4 (June 1995), all U.S. Government End Users acquire Covered Code with only those rights set forth herein.

## 11. Miscellaneous

This License represents the complete agreement concerning subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable. This License shall be governed by California law provisions (except to the extent applicable law, if any, provides otherwise), excluding its conflict-of-law provisions. With respect to disputes in which at least one party is a citizen of, or an entity chartered or registered to do business in the United States of America, any litigation relating to this License shall be subject to the jurisdiction of the Federal Courts of the Northern District of California, with venue lying in Santa Clara County, California, with the losing party responsible for costs, including without limitation, court costs and reasonable attorneys’ fees and expenses. The application of the United Nations Convention on Contracts for the International Sale of Goods is expressly excluded. Any law or regulation which provides that the language of a contract shall be construed against the drafter shall not apply to this License.

## 12. Responsibility for claims

As between Initial Developer and the Contributors, each party is responsible for claims and damages arising, directly or indirectly, out of its utilization of rights under this License and You agree to work with Initial Developer and Contributors to distribute such responsibility on an equitable basis. Nothing herein is intended or shall be deemed to constitute any admission of liability.

## 13. Multiple-licensed code

Initial Developer may designate portions of the Covered Code as “Multiple-Licensed”. “Multiple-Licensed” means that the Initial Developer permits you to utilize portions of the Covered Code under Your choice of the MPL or the alternative licenses, if any, specified by the Initial Developer in the file described in Exhibit A.

Exhibit A - Mozilla Public License.

"The contents of this file are subject to the Mozilla Public License Version 1.1 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.mozilla.org/MPL/>

Software distributed under the License is distributed on an "AS IS" basis, WITHOUT WARRANTY OF ANY KIND, either express or implied. See the License for the specific language governing rights and limitations under the License.

The Original Code is \_\_\_\_\_.

The Initial Developer of the Original Code is \_\_\_\_\_.

Portions created by \_\_\_\_\_ are Copyright (C) \_\_\_\_\_. All Rights Reserved.

Contributor(s): \_\_\_\_\_.

Alternatively, the contents of this file may be used under the terms of the \_\_\_\_\_ license (the "[ ] License"), in which case the provisions of [ ] License are applicable instead of those above. If you wish to allow use of your version of this file only under the terms of the [ ] License and not to allow others to use your version of this file under the MPL, indicate your decision by deleting the provisions above and replace them with the notice and other provisions required by the [ ] License. If you do not delete the provisions above, a recipient may use your version of this file under either the MPL or the [ ] License."

NOTE: The text of this Exhibit A may differ slightly from the text of the notices in the Source Code files of the Original Code. You should use the text of this Exhibit A rather than the text found in the Original Code Source Code for Your Modifications.

## Dropbear

Dropbear contains a number of components from different sources, hence there are a few licenses and authors involved. All licenses are fairly non-restrictive.

The majority of code is written by Matt Johnston, under the license below.

Portions of the client-mode work are (c) 2004 Mihnea Stoenescu, under the same license:

Copyright (c) 2002-2008 Matt Johnston  
Portions copyright (c) 2004 Mihnea Stoenescu  
All rights reserved.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

=====

LibTomCrypt and LibTomMath are written by Tom St Denis, and are Public Domain.

=====

sshpty.c is taken from OpenSSH 3.5p1,  
Copyright (c) 1995 Tatu Ylonen <ylo@cs.hut.fi>, Espoo, Finland  
All rights reserved

"As far as I am concerned, the code I have written for this software can be used freely for any purpose. Any derived versions of this software must be clearly marked as such, and if the derived work is incompatible with the protocol description in the RFC file, it must be called by a name other than "ssh" or "Secure Shell". "

=====

loginrec.c  
loginrec.h  
atomicio.h  
atomicio.c  
and strlcat() (included in util.c) are from OpenSSH 3.6.1p2, and are licensed under the 2 point BSD license.

loginrec is written primarily by Andre Lucas, atomicio.c by Theo de Raadt.

strlcat() is (c) Todd C. Miller

=====

Import code in keyimport.c is modified from PuTTY's import.c, licensed as follows:

PuTTY is copyright 1997-2003 Simon Tatham.

Portions copyright Robert de Bath, Joris van Rantwijk, Delian Delchev, Andreas Schultz, Jeroen Massar, Wez Furlong, Nicolas Barry, Justin Bradford, and CORE SDI S.A.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

## strace

Copyright (c) 1991, 1992 Paul Kranenburg  
Copyright (c) 1993 Branko Lankester  
Copyright (c) 1993 Ulrich Pegelow  
Copyright (c) 1995, 1996 Michael Elizabeth Chastain  
Copyright (c) 1993, 1994, 1995, 1996 Rick Sladkey  
Copyright (C) 1998-2001 Wichert Akkerman  
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.