

Overview

This guide will show you how to configure tones for your NetBorder Express gateway. There is a great variety of tones from country to country and NetBorder Express needs to be configured accordingly.

You will find that this guide has several pages but this does not mean it is a highly complex process. Rather, we have included several screenshots to guide you through the process.

There are two broad functions in the gateway regarding tones in NetBorder Express: **Tone Detection** and **Tone Generation**.

For **Tone Detection**, the NetBorder Express Gateway uses tone definition files. These are in **XML** form. All you need to adjust the tone definitions is to edit the file with a text editor or within the NetBorder Express Gateway Manager Web GUI. This guide will provide you with detailed examples using the NetBorder Express Gateway Manager Web GUI. To illustrate further, we will use Germany settings, as an example.

For **Tone Generation**, the NetBorder Express Gateway plays sound files in a **RAW** format. What you need to do to adjust Tone Generation for NetBorder Express is to use an Audio Editor application to generate the **RAW** files. This guide will provide you with ample details using screenshots from free applications.

Version 2.x of NetBorder Express is pre-configured for North American tone sets. So you do not need to perform these steps if your installation is within North America (USA and Canada).

For DTMF tones, NetBorder Express default installation is universal, so you do not have to adjust anything.

Tools and pre-Requisites

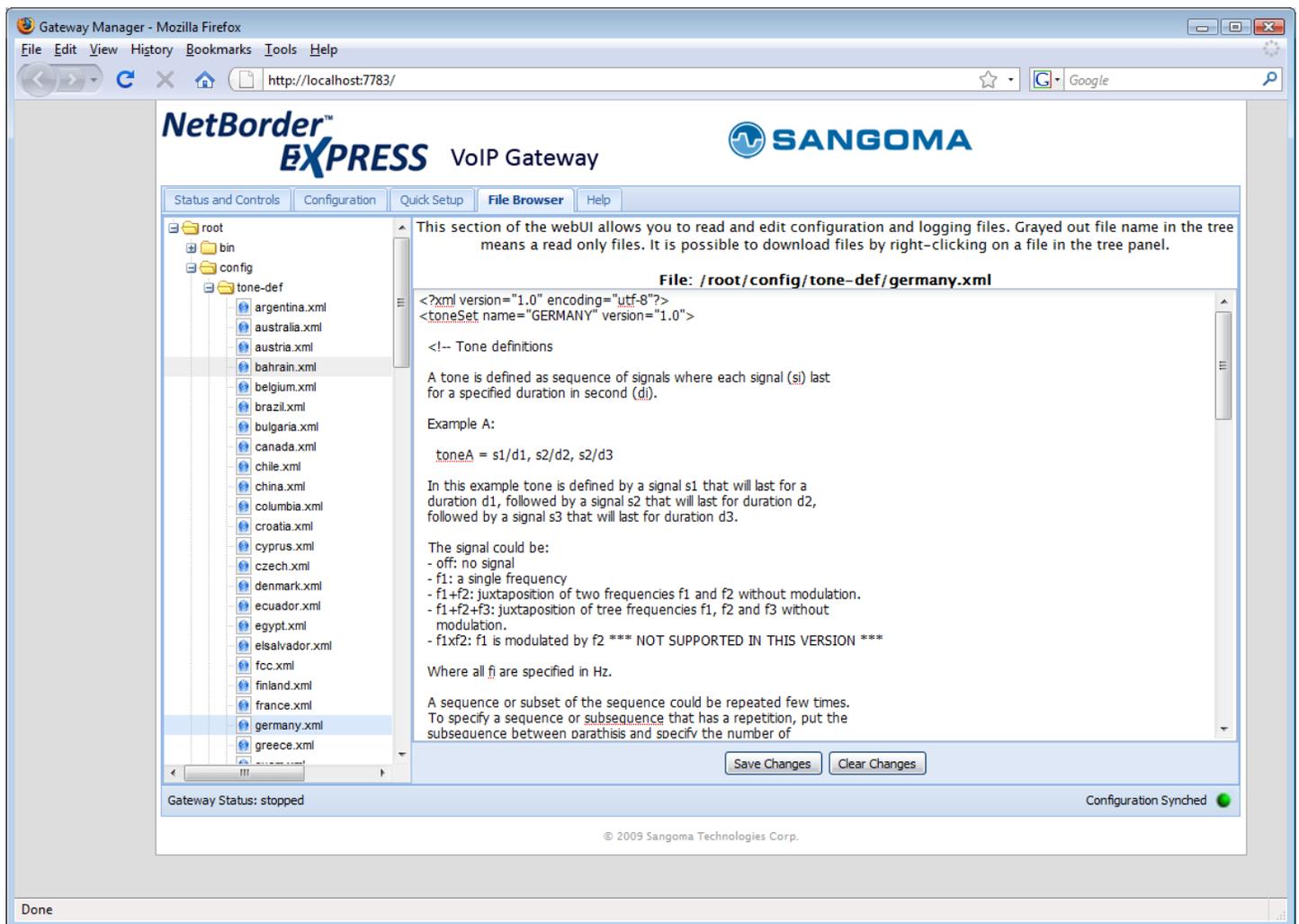
1. Pre-Installed version of **NetBorder Express**
2. Access to a Tone Definitions database. Here are some useful links:
 - http://www.itu.int/dms_pub/itu-t/oth/02/06/T02060000040002PDFE.pdf
 - <http://www.3amsystems.com/wireline/tone-search.htm>
3. Pre installed Audio Editors. Here you will need 2 applications: **Audacity** and **NCH Audio Switch**. These are free applications.
 - To create **WAV** files, Audacity is required. You can get it here:
<http://audacity.sourceforge.net/download/>. At the time of this writing, version 1.2.6 was used.
 - NCH Audio Switch is required to convert the **WAV** files into **RAW** format. You can get it here:
<http://www.nch.com.au/switch/> . At the time of this writing, version 2.01 was used.

Let's get started!

Configuring Tone Detection

This step requires the editing of the tone definition XML files. Here we will use **Germany** as an example.

1. Launch the NetBorder Gateway Manager Utility (here on the localhost:7783) and point it to the **File Browser** sub menu and then to the **config** and then **tone-def** subfolder. Scroll down to **Germany** and click once on the file name. The XML file is now ready to be edited.



Gateway Manager - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost:7783/

NetBorder EXPRESS VoIP Gateway **SANGOMA**

Status and Controls Configuration Quick Setup **File Browser** Help

root
bin
config
tone-def
argentina.xml
australia.xml
austria.xml
bahrain.xml
belgium.xml
brazil.xml
bulgaria.xml
canada.xml
chile.xml
china.xml
columbia.xml
croatia.xml
cyprus.xml
czech.xml
denmark.xml
ecuador.xml
egypt.xml
elsalvador.xml
fcc.xml
finland.xml
france.xml
germany.xml
greece.xml

This section of the webUI allows you to read and edit configuration and logging files. Grayed out file name in the tree means a read only files. It is possible to download files by right-clicking on a file in the tree panel.

File: /root/config/tone-def/germany.xml

```
<?xml version="1.0" encoding="utf-8"?>
<toneSet name="GERMANY" version="1.0">

<!-- Tone definitions

A tone is defined as sequence of signals where each signal (si) last
for a specified duration in second (di).

Example A:
toneA = s1/d1, s2/d2, s2/d3

In this example tone is defined by a signal s1 that will last for a
duration d1, followed by a signal s2 that will last for duration d2,
followed by a signal s3 that will last for duration d3.

The signal could be:
- off: no signal
- f1: a single frequency
- f1+f2: juxtaposition of two frequencies f1 and f2 without modulation.
- f1+f2+f3: juxtaposition of tree frequencies f1, f2 and f3 without
modulation.
- f1xf2: f1 is modulated by f2 **** NOT SUPPORTED IN THIS VERSION ****

Where all fi are specified in Hz.

A sequence or subset of the sequence could be repeated few times.
To specify a sequence or subsequence that has a repetition, put the
subsequence between parathisis and speciv the number of
```

Save Changes Clear Changes

Gateway Status: stopped Configuration Synced

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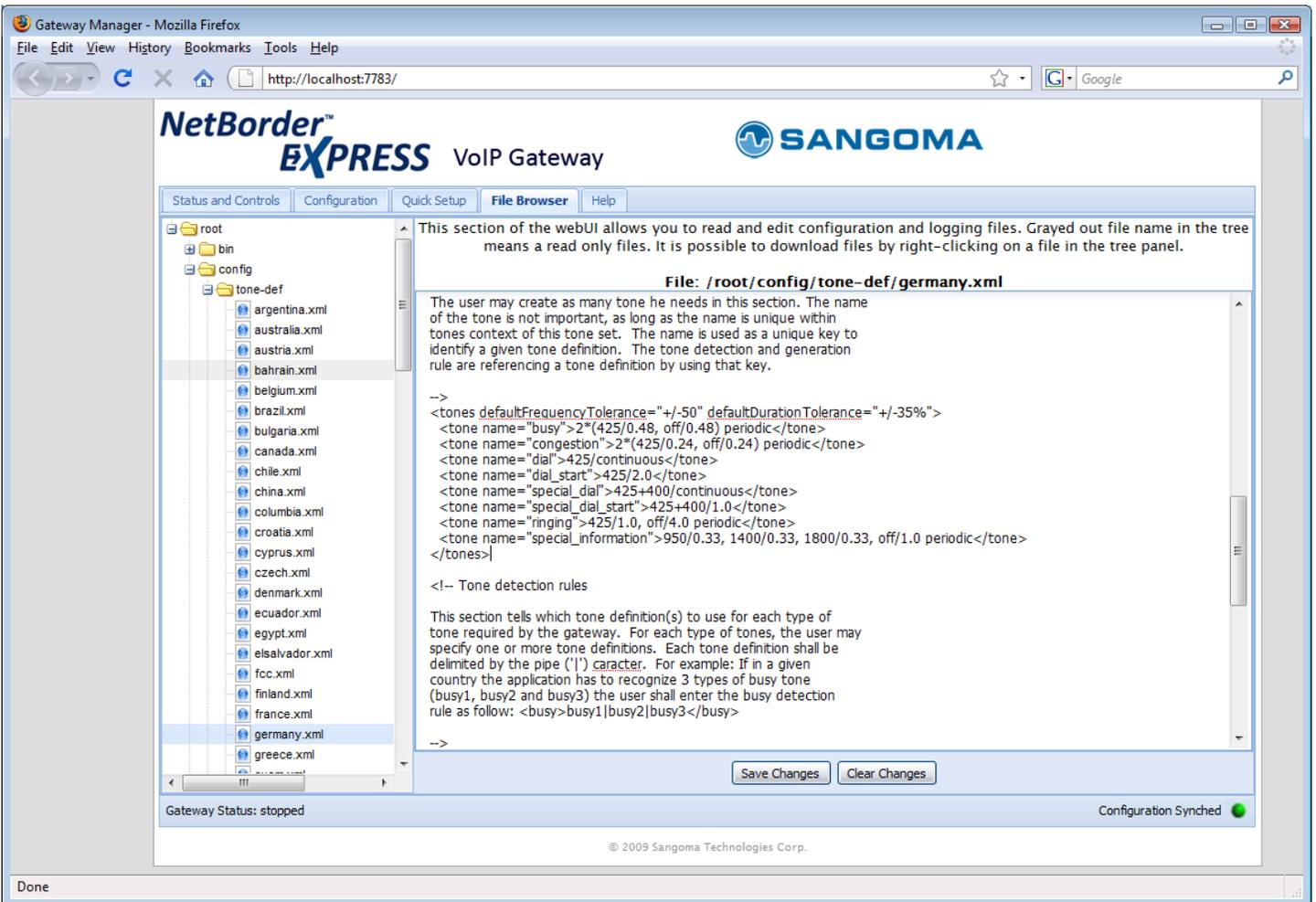
Done

2. You need first to datafill tone definitions and then assign them to Tone Detection Rules.

You need at this point the tone definitions for Germany. These are:

- Busy Tone: 425 Hz for 0.48 sec, OFF for 0.48 sec, repeat
- Reorder Tone / Congestion Tone: 425 Hz for 0.24 sec, OFF for 0.24 sec, repeat
- Dial Tone: 425 Hz Continuous
- Ringing Tone: 425 Hz for 1.0 sec, OFF for 4.0 sec, repeat
- Call Waiting: 425 Hz for 0.2 sec, OFF for 0.2 sec, 425 Hz for 0.2 sec, OFF for 5.0 sec, repeat
- SIT Tone: 950 Hz for 0.33 sec, 1400 Hz for 0.33 sec, 1800 Hz for 0.33 sec, OFF for 1.0 sec, repeat

Here is the **germany.xml** file updated with the German specifications:



The screenshot shows the NetBorder EXPRESS VoIP Gateway web interface in Mozilla Firefox. The browser address bar shows `http://localhost:7783/`. The interface has a navigation menu with tabs for Status and Controls, Configuration, Quick Setup, File Browser, and Help. The File Browser tab is active, displaying a file tree on the left with folders `root`, `bin`, and `config`. Under `config`, there is a `tone-def` folder containing various country XML files, with `germany.xml` selected. The main content area shows the XML content of `File: /root/config/tone-def/germany.xml`. The XML includes tone definitions for busy, congestion, dial, dial_start, special_dial, special_dial_start, ringing, and special_information tones. Below the XML, there is a section for tone detection rules, explaining how to specify tone definitions for different types of tones. At the bottom of the interface, there are buttons for "Save Changes" and "Clear Changes", and a status indicator showing "Gateway Status: stopped" and "Configuration Synched".

```

<!-- This section of the webUI allows you to read and edit configuration and logging files. Grayed out file name in the tree means a read only files. It is possible to download files by right-clicking on a file in the tree panel.

File: /root/config/tone-def/germany.xml

The user may create as many tone he needs in this section. The name of the tone is not important, as long as the name is unique within tones context of this tone set. The name is used as a unique key to identify a given tone definition. The tone detection and generation rule are referencing a tone definition by using that key.

-->
<tones defaultFrequencyTolerance="+/-50" defaultDurationTolerance="+/-35%">
  <tone name="busy">2*(425/0.48, off/0.48) periodic</tone>
  <tone name="congestion">2*(425/0.24, off/0.24) periodic</tone>
  <tone name="dial">425/continuous</tone>
  <tone name="dial_start">425/2.0</tone>
  <tone name="special_dial">425+400/continuous</tone>
  <tone name="special_dial_start">425+400/1.0</tone>
  <tone name="ringing">425/1.0, off/4.0 periodic</tone>
  <tone name="special_information">950/0.33, 1400/0.33, 1800/0.33, off/1.0 periodic</tone>
</tones>

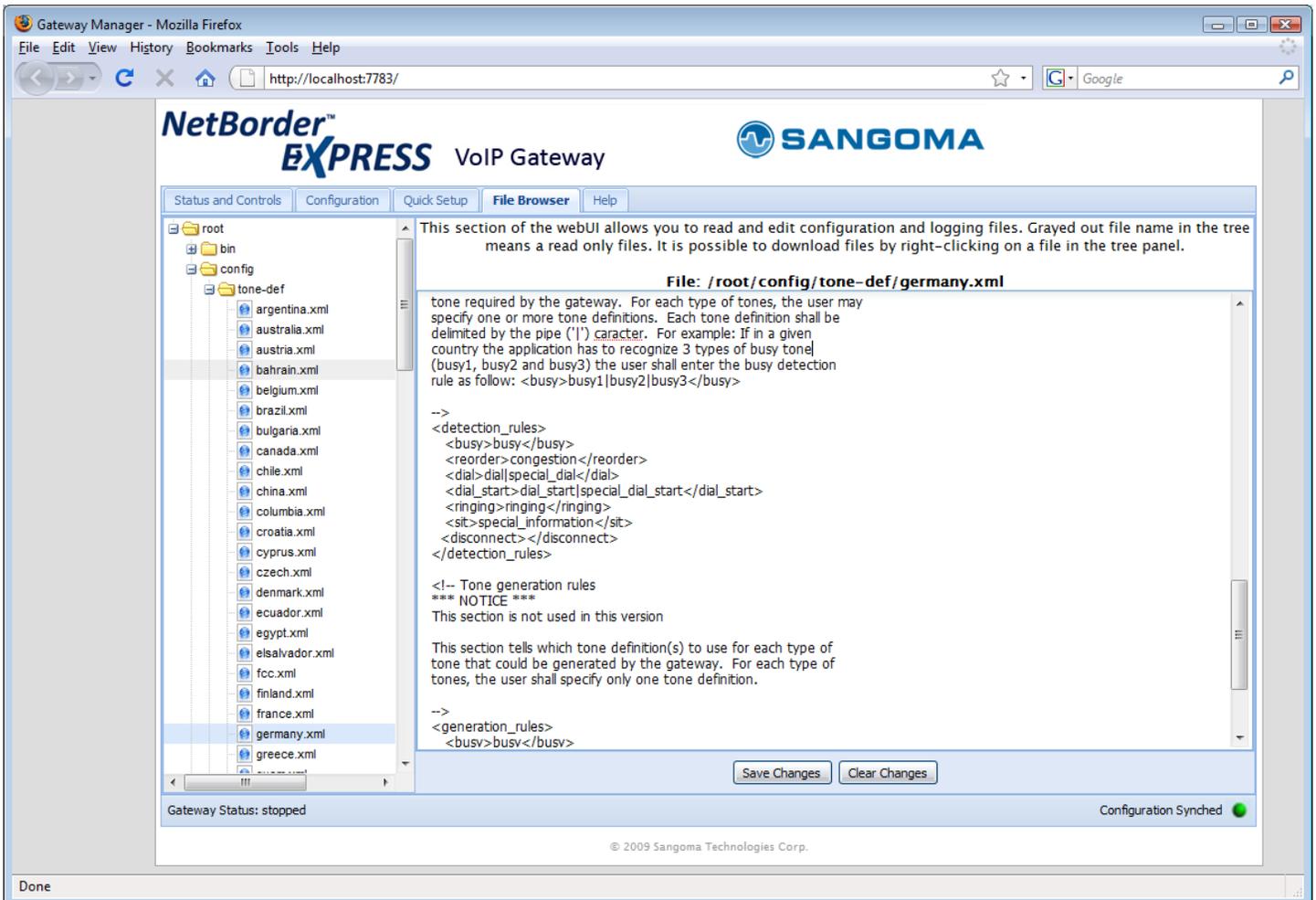
<!-- Tone detection rules

This section tells which tone definition(s) to use for each type of tone required by the gateway. For each type of tones, the user may specify one or more tone definitions. Each tone definition shall be delimited by the pipe (|) character. For example: If in a given country the application has to recognize 3 types of busy tone (busy1, busy2 and busy3) the user shall enter the busy detection rule as follow: <busy>busy1|busy2|busy3</busy>

-->

```

- Next Step is to edit the Detection Rules in the same file (scroll down). Here is the updated file for our Germany example. Do not forget to click on the **Save Changes** button!



The screenshot shows the NetBorder EXPRESS VoIP Gateway web interface in Mozilla Firefox. The browser address bar shows `http://localhost:7783/`. The interface includes a navigation menu with tabs for Status and Controls, Configuration, Quick Setup, File Browser, and Help. The File Browser tab is active, displaying a file tree on the left with the following structure:

- root
 - bin
 - config
 - tone-def
 - argentina.xml
 - australia.xml
 - austria.xml
 - bahrain.xml
 - belgium.xml
 - brazil.xml
 - bulgaria.xml
 - canada.xml
 - chile.xml
 - china.xml
 - columbia.xml
 - croatia.xml
 - cyprus.xml
 - czech.xml
 - denmark.xml
 - ecuador.xml
 - egypt.xml
 - elsalvador.xml
 - fcc.xml
 - finland.xml
 - france.xml
 - germany.xml
 - greece.xml

The main content area displays the configuration for the selected file, `/root/config/tone-def/germany.xml`. The text in the editor is as follows:

```

tone required by the gateway. For each type of tones, the user may
specify one or more tone definitions. Each tone definition shall be
delimited by the pipe ('|') character. For example: If in a given
country the application has to recognize 3 types of busy tone|
(busy1, busy2 and busy3) the user shall enter the busy detection
rule as follow: <busy>busy1|busy2|busy3</busy>

-->
< detection_rules>
  < busy>busy</ busy>
  < reorder>congestion</ reorder>
  < dial>dial|special_dial</ dial>
  < dial_start>dial_start|special_dial_start</ dial_start>
  < ringing>ringing</ ringing>
  < sit>special_information</ sit>
  < disconnect></ disconnect>
</ detection_rules>

<!-- Tone generation rules
*** NOTICE ***
This section is not used in this version

This section tells which tone definition(s) to use for each type of
tone that could be generated by the gateway. For each type of
tones, the user shall specify only one tone definition.

-->
< generation_rules>
  < busv>busv</ busv>
  
```

At the bottom of the configuration area, there are two buttons: **Save Changes** and **Clear Changes**. The status bar at the bottom of the interface shows "Gateway Status: stopped" and "Configuration Synced" with a green indicator.

Configuring Tone Generation

For **Tone Generation**, you will have to **generate 8 RAW** files with a sound editor. These files will have to be named in a specific way and copied in the proper folder, as shown in the picture below. It looks like they have a funny naming convention, but they really refer to tone IDs defined by the IETF RFC2833 (RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals). A-Law and u-Law refer to different companding algorithms. In general terms, u-law is in use in North America and A-law is used in the rest of the world. The files are located under the *data* and *tone-waves* folders.

tone_70_alaw = Ringing Tone

tone_70_ulaw = Ringing Tone

tone_72_alaw = Busy Tone

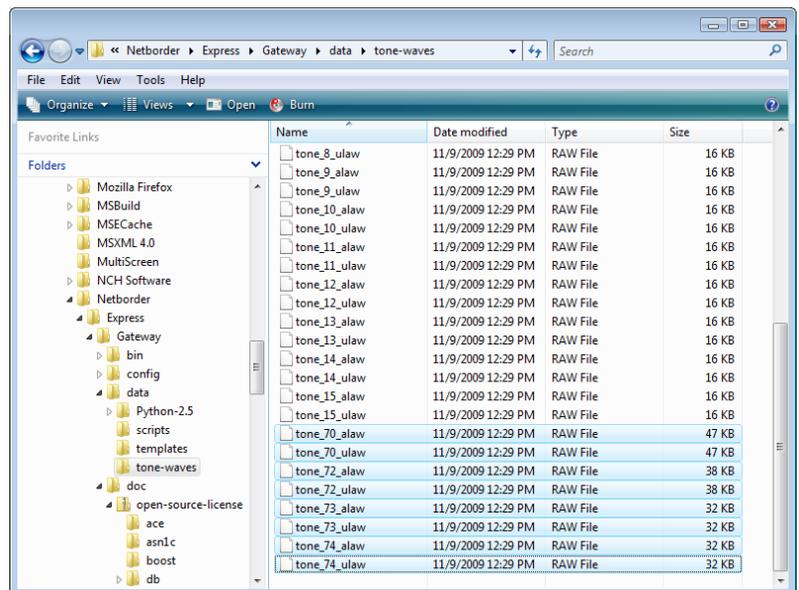
tone_72_ulaw = Busy Tone

tone_73_alaw = Congestion Tone

tone_73_ulaw = Congestion Tone

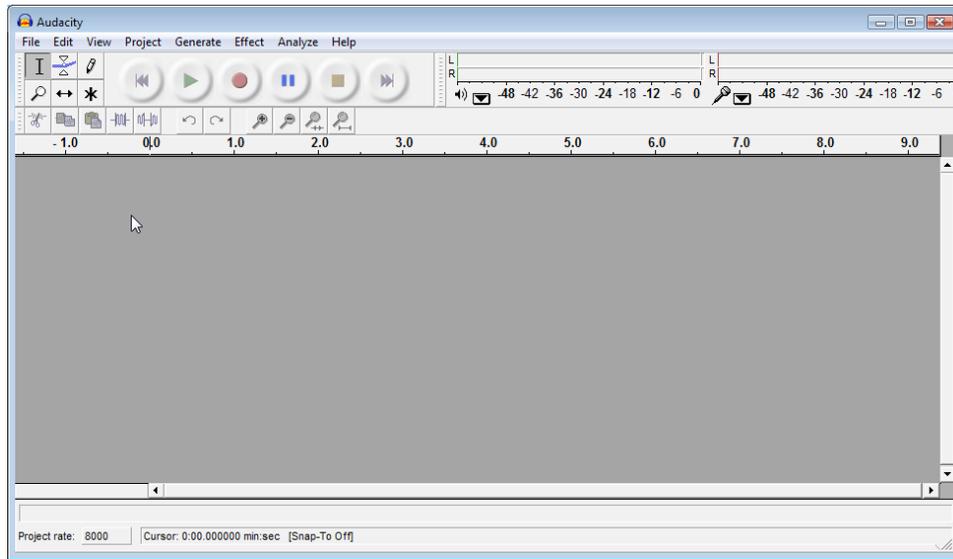
tone_74_alaw = Special Information Tone

tone_74_ulaw = Special Information Tone

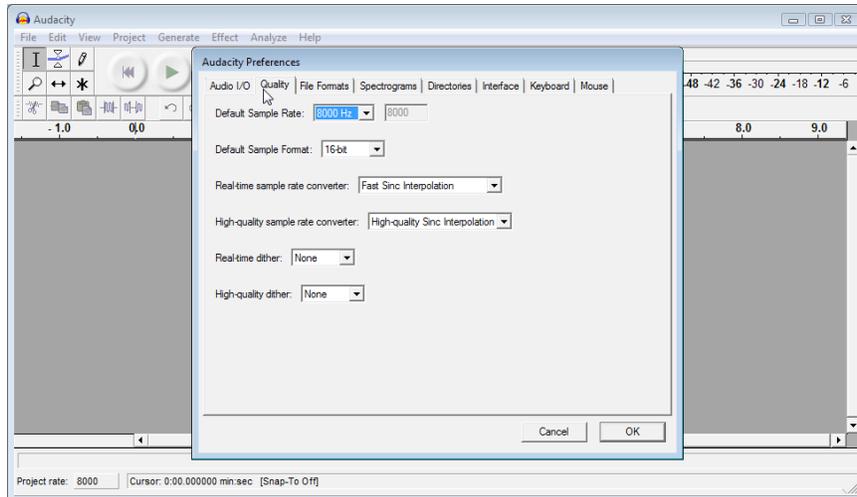


The **RAW** files that are pre-installed correspond to North American tones. So for our Germany example, we will need to create new ones. For this, we will use **Audacity**.

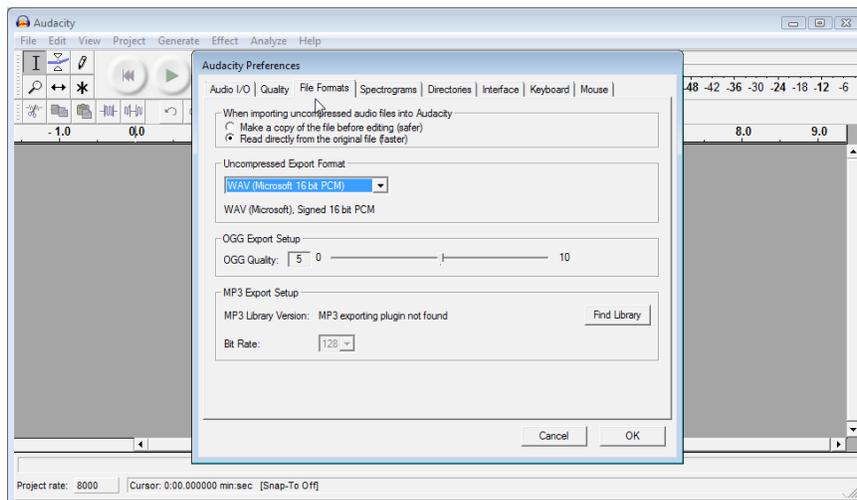
1. Launch the Audacity application. It should look as follows:



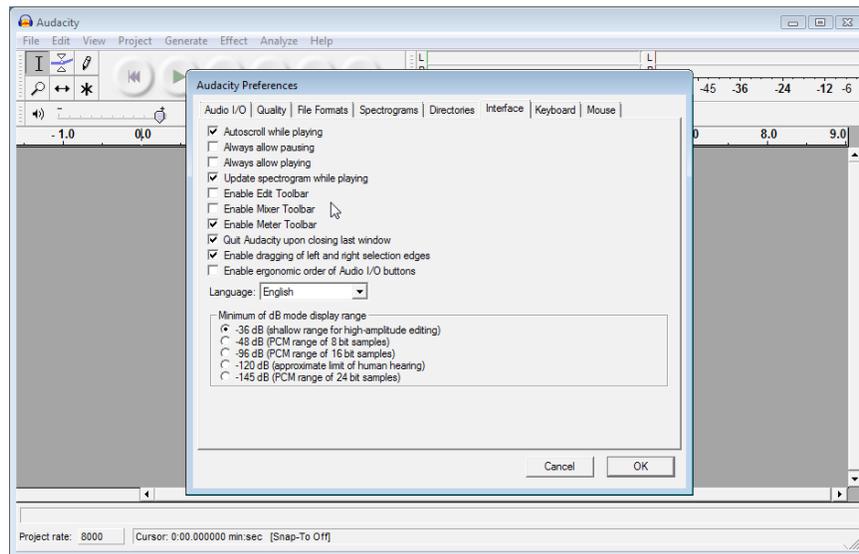
2. We now need to edit preferences of the software. Go to the **Edit** menu and select **Preferences...**
Select the **Quality** tab. Set **Sample Rate** at 8000 Hz and the **Default Sample Format** at 16 bit as follows:



- Under the **File Formats** tab, set the **Uncompressed Export Format** to WAV (Microsoft 16 bit PCM) as follows:

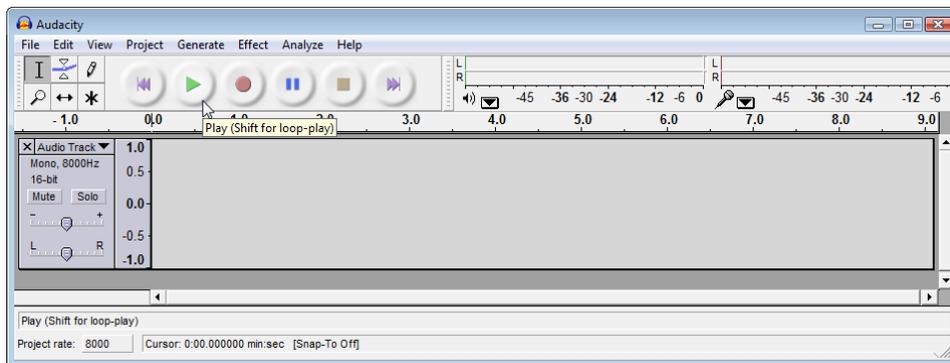


Under the **Interface** tab, unselect the **Edit** and **Mixer Toolbar** options as follows:

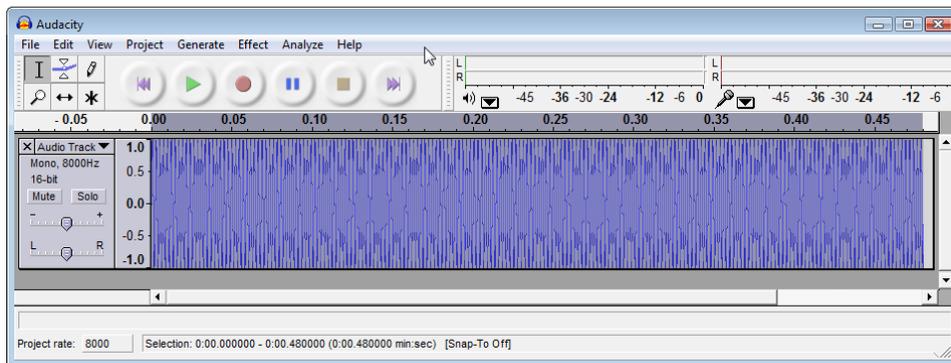
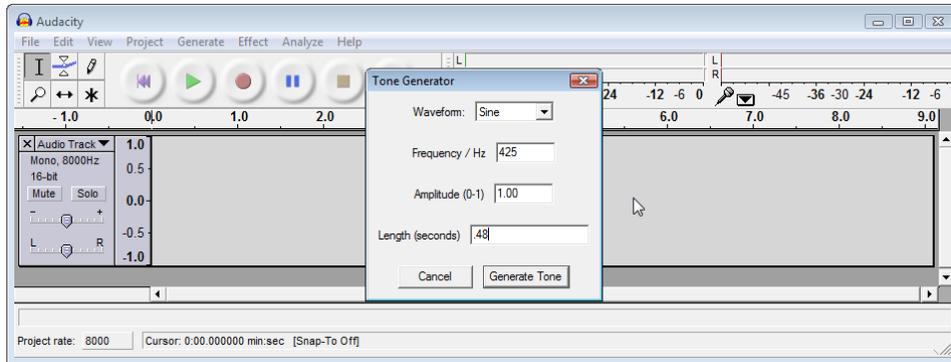


3. We are now ready to start editing a sound file. Let's start with the **Germany Busy Tone**, which is defined as 425 Hz for 0.48 sec, OFF for 0.48 sec.

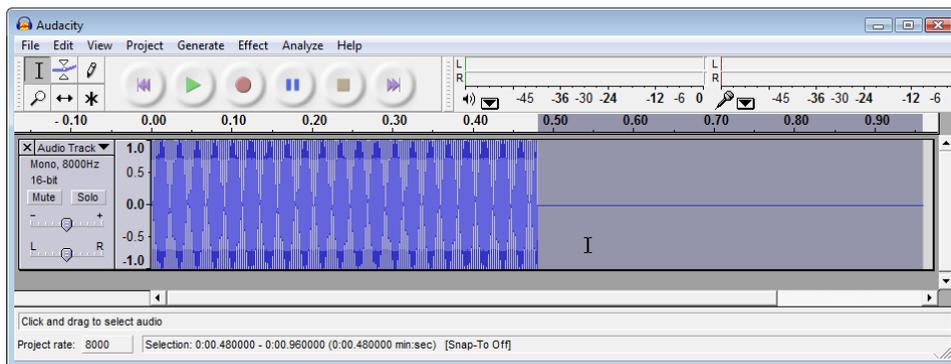
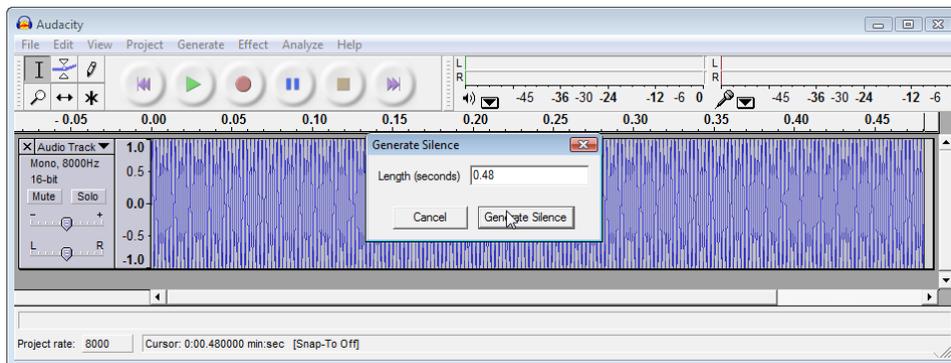
Go to **Project > New Audio Track**



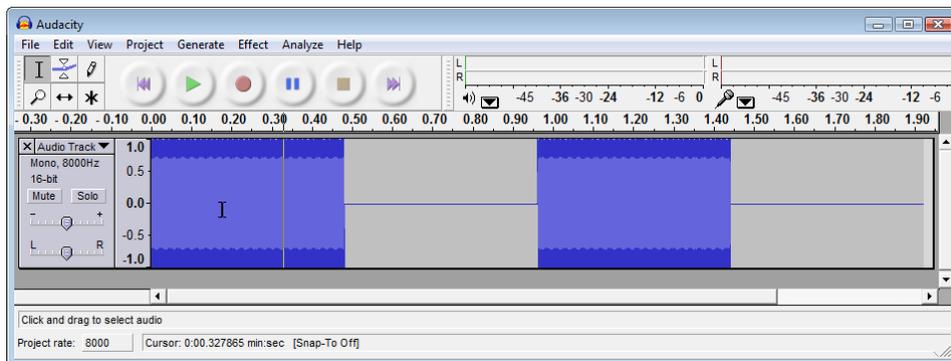
4. Go to **Generate > Tone**. Enter the frequency and duration in seconds (here 425Hz for 0.48 sec.) and click **Generate Tone**.



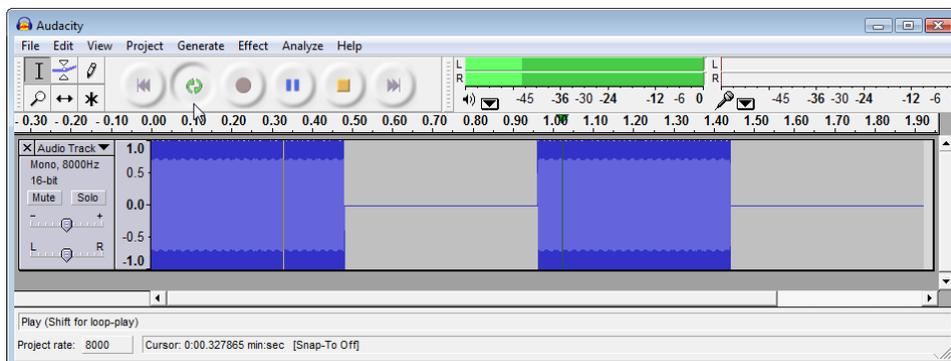
5. Go to **Edit > Move Cursor > to Track End** to position you cursor at the end of the track.
6. Go to **Generate > Silence**. Insert a silence for 0.48 sec.



7. Repeat the process so that you have at least 2 cycles. You track should look now as follows:

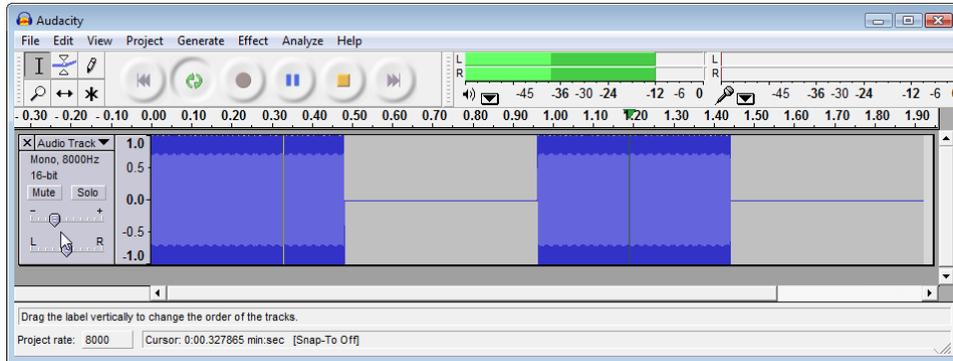


8. Now you can listen to the track for verification and to check the volume. Hold the shift key and click on the play button for loopback playing. It sounds like a Busy Tone!

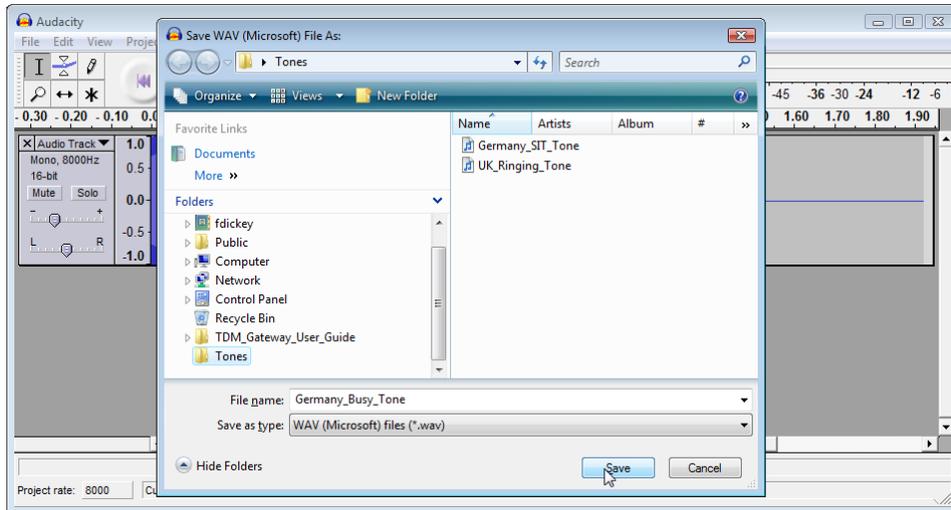


9. However, the volume is too loud (green bars on the meter toolbar).
As a rule of thumb, you should stay below -12 dB.

While the track is playing in loopback, slide the volume to the left to lower the volume.



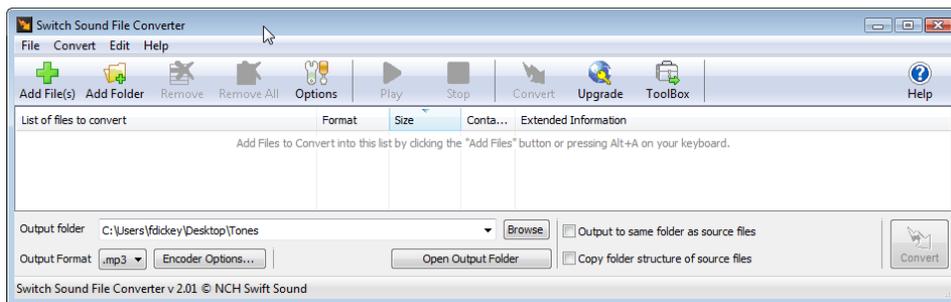
10. Now we are ready to save our file. Go to **File > Export as WAV** and save your file



11. Repeat this process for all your tones. Once you have the WAV files for all your tones, you are ready to produce the **RAW** files.

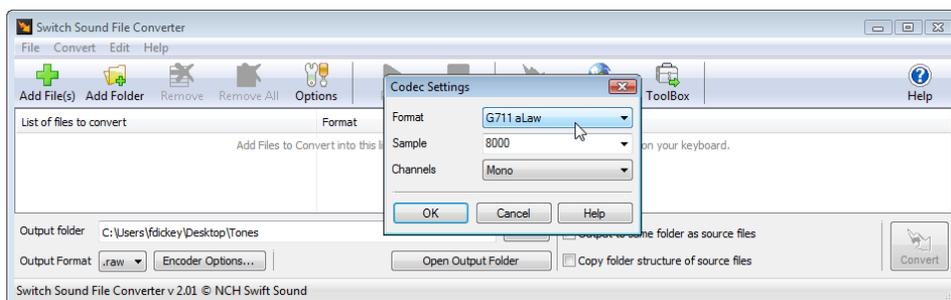
12. We are now ready to generate the **RAW** files using NCH Audio Converter.

13. Open NCH Audio Converter.

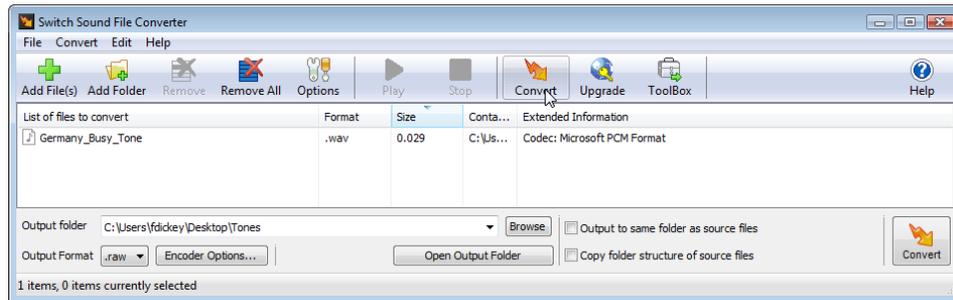


14. We now need to set some preferences.

Set the **Output Format** to **RAW** and the **Encoder Options** as shown below. For the Format option, flip between G711 aLaw or G711 ulaw.



15. Add the files (click on the large green + sign) and click on the convert button



16. Rename your files according to the list provided above [in this example *tone_72_alaw.raw* (for busy tone)] and copy it in the **NetBorder Express > Gateway > data > tone-wav** folder. (you may want to make copies of the existing files first)

17. You will need to repeat this process for all the WAV files you have previously created.

Appendix A

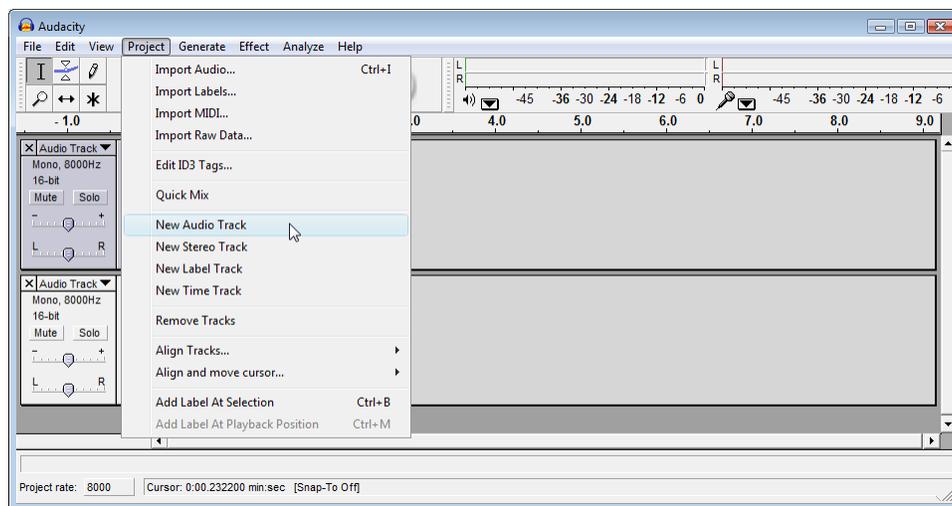
How do I use Audacity for tones that require 2 or more frequencies at the same time?

Some countries have tones that have multiple frequencies playing at the same time. For example, in the UK, the Ringing Tone is defined as: [400Hz+450Hz] on for 0.4 sec, OFF for 0.2 sec, [400Hz+450Hz] on for 0.4 sec, OFF for 2.0 sec

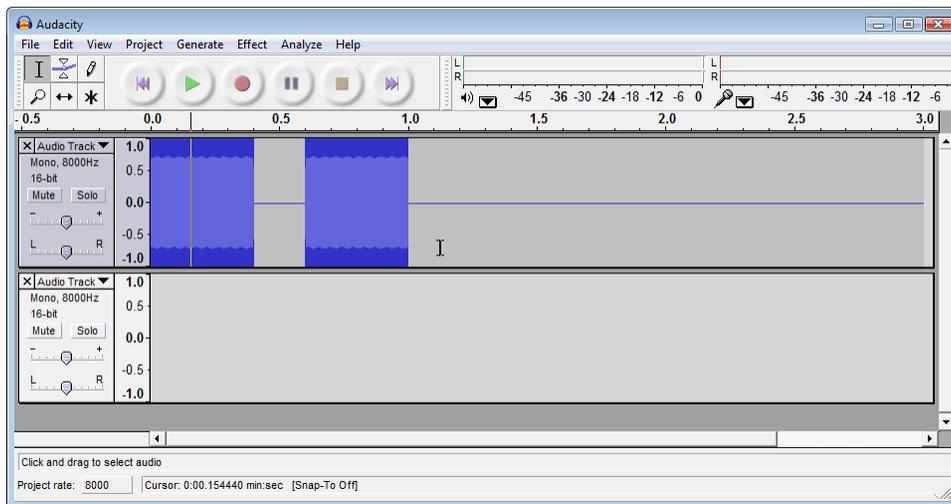
To do this in Audacity, you need to work with **2 separate tracks** that are merged when saving the project file.

Let's see how.

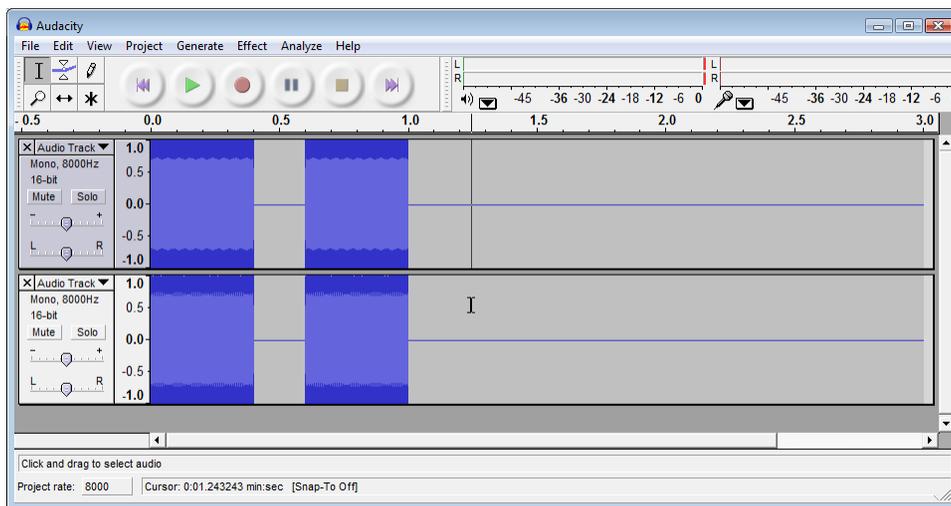
1. Open Audacity and add two audio tracks from the Project Menu:



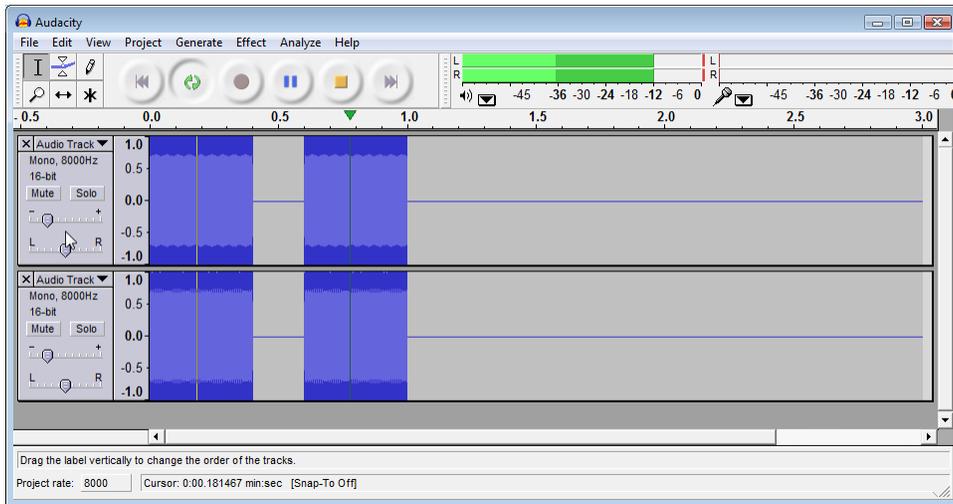
2. Let's now work on the first track for the 400Hz frequency by adding the proper tones and silences with the right intervals:



3. Let's now work on the other frequency of 450Hz, on the other Audio Track:

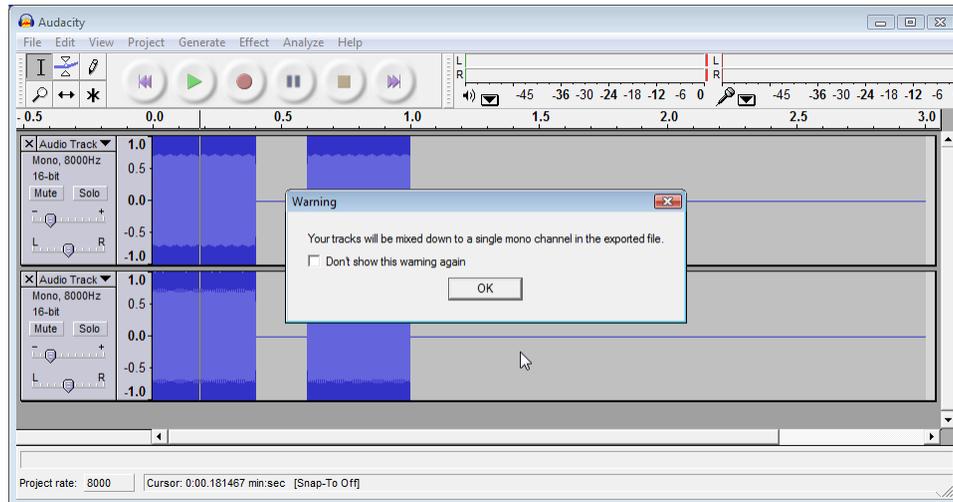


4. We need to adjust the volume so as not to go above -12dB. Slide the volume meters on both tracks equally. In this case, we moved the slides down to approximately -18dB each to get a combined mixed signal that does not go above -12dB:



5. You are now ready to save the project in **WAV** format. Go to the File menu and select **Export as WAV...**

Audacity will prompt you to that your tracks will be mixed to as single mono channel. Click OK and save your WAV file.



6. To convert to **RAW** format, proceed as explained earlier in this document.