Troubleshooting choppy sound in MOH files played over the phone

Applies to VoipNow 3 and higher!

This article informs you about the main aspects that have to be taken into consideration in order to avoid the music on hold files to sound choppy over the phone. This depends by the used codec, but for normal like G711 the information below are still correct

Voice frequency

A voice frequency (VF) or voice band is one of the frequencies within the human audibility range that it is used for speech transmission. In IP telephony, the usable voice frequency band ranges from approximately 300 Hz to 3,400 Hz. This is the reason why the ultra low frequency band of the electromagnetic spectrum ranging between 300 and 3,000 Hz is referred to as voice frequency despite the fact that this is electromagnetic energy.

The bandwidth allocated for a single voice frequency transmission channel is usually 4 kHz, including guard bands, thus allowing for a sampling rate of 8 kHz to be used as the basis of the pulse code modulation system within the digital PSTN. As a VoIP telephony PBX, Asterisk is optimized to work within the 350 Hz - 3,450 Hz voice frequency band. For this reason, sound files must be in the unsigned linear 8 kHz 16 bit mono format. If an uploaded file is not in this format, it is automatically converted to it. This may lead to some sounds being rendered differently after the upload.

Base frequency

The voiced speech of a typical adult male has a base frequency of 85 Hz to 155 Hz and that of a typical adult female, of 165 to 255 Hz. Therefore, the base frequency of most speeches falls below the lower limit of the **voice frequency** band, as defined earlier. However, there are sufficient harmonic series that work without the missing fundamental ones and create the impression of hearing the fundamental tone.

Why do some MOH files sound choppy

The human ear can respond to minute pressure variations in the air if they are within the audibility frequency range, roughly from 20 Hz to 20 kHz. That is why the frequency of most music files we listen to ranges within this band. Since voice frequency for telephony is limited to a band ranging between 350Hz and 3.45 kHz, there is a big chance that our music files are not compatible with Asterisk and telephony in general.

Playing a file that has higher or lower frequencies compared to the ones used in telephony may cause the system to cut off the higher or the lower frequencies. This is how we end up with a choppy sound.

Step-by-step guide

If you really want to install a sound file with frequencies higher/lower than the ones used in telephony, then you can modify the file by cutting off the higher /lower frequencies with the help of a sound editor.

For example, you could use Audacity (remember that you can use any wave editor you like), which is freeware and supports a large variety of operating systems.

To modify a sound file, take the following steps:

STEP 1: Load the sound file in Audacity.

STEP 2: When the file is loaded, the application displays the wave form. Press **Ctrl+A** to select it.

STEP 3: Go to **Effects** and select the **High** pass filter. This allows you to remove all frequencies lower than the one currently set as the higher limit. Please enter 450 Hz and press **OK** in the dialogue window.

STEP 4: At this point, you need to select the whole file again using **Ctrl+A**. Then go to **Effects**, select the **Low** pass filter, enter 3,450 Hz and press **OK**.

STEP 5: Now that you have cut off frequencies lower than 450Hz (with the **High** pass filter) and higher than 3,450Hz (with the **Low** pass filter) as well, you can save the file and upload it into the interface.

Note that the sound is perceived differently, depending on the number of frequencies deleted. Be that as it may, at least it does not sound choppy over the phone.

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