xHE-AAC Encoder Plugin for FFmpeg 3.3
Release Notes

Contents

1. General Overview

Nowadays FFmpeg is widely used in professional content production for file-based transcoding (xHE-AAC and legacy AAC) as well as live (legacy AAC only) use cases. Although FFmpeg supports most video and audio formats natively, there is no way to create xHE-AAC compliant streams within an FFmpeg workflow. The MainConcept xHE-AAC Encoder Plugin for FFmpeg is a convenient way to solve this problem because it seamlessly integrates into FFmpeg.

2. Software Requirements

To use MainConcept xHE-AAC Encoder Plugin for FFmpeg, you must have a compatible configuration.

Supported Operating Systems:
- Microsoft® Windows® 10, Windows 11 (64-bit, x86 only)
- Linux x86 Ubuntu 20.04 LTS (glibc 2.31), Rocky Linux 8 (glibc 2.28)
- Linux ARM Ubuntu 20.04 glibc 2.31 (64-bit)

Software Requirements:
MainConcept modified versions of FFmpeg (see available download below):

- FFmpeg 4.4 "Rao"
- FFmpeg 6.0 "Von Neumann"
- FFmpeg 7.0 "Dijkstra"

To run the MainConcept xHE-AAC Encoder Plugin for FFmpeg the following software packages must be installed in this order:

1) Modified FFmpeg version (FFmpeg 4.4, 6.0 or 7.0) as ready-to-use binary or as source code that you must compile yourself. The binaries can be found on the MainConcept website. The source code for both modified FFmpeg versions can be found on public GitHub: https://github.com/MainConcept/mc-ffmpeg-omx
2) For testing the plugin, download the free MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo version installer from the MainConcept website: https://www.mainconcept.com/. It also works for FFmpeg 4.4, 6.0 and 7.0.
3) For an already licensed plugin, install the full version of the MainConcept xHE-AAC Encoder Plugin for FFmpeg after purchase. It also works for FFmpeg 4.4, 6.0 and 7.0.

NOTE:
The demo version of the MainConcept xHE-AAC Encoder Plugin for FFmpeg is fully functional. It only mutes audio from time to time.

After installation, the FFmpeg Plugin's User Guide can be found here:

- **Windows:** *C:\Program Files\MainConcept\FFmpeg-PlugIns\doc*
- **Linux:** *~/share/doc/*

3. Installation

3.1   Installation on Windows

To run the MainConcept xHE-AAC Encoder Plugin for FFmpeg on Windows the following software packages must be installed in this order:

1. Install modified FFmpeg
2. Install MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo or Full version

3.1.1   Modified FFmpeg & Demo Plugin Installation on Windows

First, you need to install the required FFmpeg version for the MainConcept FFmpeg Plugins on your system. Please follow the steps below.

1. Run the "ffmpeg_static_<ffmpeg_id>-omx_win64_<version_id>.exe" installer file to launch the installation wizard. In the **Welcome** dialog, click Next to proceed.

2. When the license agreement (EULA) appears on the screen, review it carefully. Click **I Agree** to accept the terms. If you do not agree, the installation process will be aborted.

3. You are asked for the destination folder, where FFmpeg should be installed. We recommend using the default location. Click **Next** to proceed.

   NOTE:
   You must also install the MainConcept xHE-AAC Encoder Plugin Demo or the MainConcept xHE-AAC Encoder Plugin for FFmpeg Full version to this folder later.

4. Choose a Start Menu folder. We recommend using the default location. Click **Next** to proceed.

5. Now the installation starts. An indicator will show the installation process.

6. When the following dialog box appears, click **Finish** to complete the setup.

FFmpeg is now installed on your computer!

You must now install the MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo version for evaluation. It must be installed to the same location where you have installed FFmpeg before:

7. Run the "mainconcept_ffmpeg_plugin_demo_enc_xheaac" installer file to launch the installation wizard. In the **Welcome** dialog, click **Next** to proceed.

8. When the license agreement (EULA) appears on the screen, review it carefully. Click **I Agree** to accept the terms. If you do not agree, the installation process will be aborted.

9. You are asked for the destination folder. However, the MainConcept FFmpeg Plugin Demo must be installed to the same folder where FFmpeg was installed before. Click **Next** to proceed.

10. Choose a Start Menu folder. We recommend using the default location. Click **Next** to proceed.

11. Now the installation starts. An indicator will show the installation process.

12. When the following dialog box appears, click **Finish** to complete the setup.

The MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo is now installed on your computer! You can now start evaluating the software.

3.1.2 MainConcept xHE-AAC Encoder Plugin Full Version Installation on Windows

In this short chapter, we briefly describe how to install the full version of the MainConcept xHE-AAC Encoder Plugin for FFmpeg if you already own a valid license after purchase. It must be installed to the same location where you have installed FFmpeg before.

1. If you haven't installed the modified FFmpeg yet, please follow the steps 1 – 6 from the previous chapter.

2. Run the "mainconcept_xheaac_encoder_plugin_full" installer file to launch the installation wizard. In the **Welcome** dialog, click **Next** to proceed.

3. When the license agreement (EULA) appears on the screen, review it carefully. Click **I Agree** to accept the terms. If you do not agree, the installation process will be aborted.

4. You are asked for the destination folder. However, the MainConcept MainConcept xHE-AAC Encoder Plugin must be installed to the same folder where FFmpeg was installed before. Click **Next** to proceed.

5. Under Windows, you can also choose a Start Menu folder. We recommend using the default location. Click **Next** to proceed.

6. When the following dialog box appears, click **Finish** to complete the setup.

The MainConcept xHE-AAC Encoder Plugin for FFmpeg is now installed on your computer! You now need to activate the licensed version of the software before it can be used.

3.2   Installation on Linux

To run the MainConcept xHE-AAC Encoder Plugin for FFmpeg on Linux the following software packages must be installed in this order:

1. Install modified FFmpeg
2. Install MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo or Full version

3.2.1 Modified FFmpeg & Demo Plugin Installation on Linux

As a first package, you must install the MainConcept modified version of FFmpeg that enables MainConcept FFmpeg Plugins:

1. Unpack the downloaded package and run the self-extracting executable and accept the EULA:

```
tar xf mc_ffmpeg_installer_linux_x64_<version_id>.tar.bz2
./ffmpeg_static_<ffmpeg_id>-omx_linux_x64_<version_id>.run
```

2. Install the package file according to your Linux base system:

    Debian-based Linux:

```
sudo dpkg -i ffmpeg_omx/deb/ffmpeg-static_<ffmpeg_id>.deb
```

    RPM-based Linux:

```
sudo dnf install ffmpeg_omx/rpm/ffmpeg-static-<ffmpeg_id>.rpm
```

3. Verify that the MainConcept modified FFmpeg is correctly installed by calling *ffmpeg* from the installation folder:

    /opt/mainconcept/ffmpeg-omx/bin/ffmpeg

```
ffmpeg version n4.2.1-456-g7af8b3b Copyright (c) 2000-2019 the FFmpeg developers built
with gcc 4.8.5 (GCC) 20150623 (Red Hat 4.8.5-39) configuration: --disable-ffplay --
disable-doc --enable-static --disable-shared --disable-debug --enable-asm --cc=gcc --
enable-x86asm --enable-omx --enable-omx_enc_avc --enable-omx_enc_hevc --enable-
omx_enc_xheaac --extra-cflags=-I../omxil_common/include/omx --prefix=../dist/linux-x64
```

> **NOTE:**
> *You should see output containing "--enable-omx --enable-omx_enc_avc --enable-omx_enc_hevc, --enable-omx_enc_xheaac"*

FFmpeg is now installed on your computer!

You must now install the MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo version for evaluation:

4. Unpack the demo plugin tarball, then run the self-extracting executable and accept the EULA:

```
tar xf
demo_mc_ffmpeg_plugin_xheaac_encoder_installer_unencrypted_gcc_linux_x64_<version_id>.tar.bz2

./mainconcept_ffmpeg_xheaac_encoder_linux_x64_demo_<version_id>.run
```

5. Install the package files according to your Linux base system:

Debian-based Linux:

```
cd mc_ffmpeg_plugins/deb/
sudo dpkg -i mcomx-core_<version_id>_amd64.deb
sudo dpkg -i mc-encxheaac_<version_id>_amd64.deb
sudo dpkg -i mc-encxheaac-demo_<version_id>_amd64.deb
sudo dpkg -i mc-sdk-conf_<version_id>_amd64.deb

Alternatively, you can install all at once:

sudo dpkg -i *.deb
```

RPM-based Linux:

```
cd mc_ffmpeg_plugins/rpm/
sudo dnf install mcomx-core_<version_id>.x86_64.rpm
sudo dnf install mcomx-encxheaac_<version_id>.x86_64.rpm
sudo dnf install mc-encxheaac-demo_<version_id>.x86_64.rpm
sudo dnf install mc-sdk-conf_<version_id>.x86_64.rpm

Alternatively, you can install all at once:

sudo dnf install *
```

The MainConcept xHE-AAC Encoder Plugin for FFmpeg Demo is now installed on your computer! You can now start evaluating the software.

3.2.2 MainConcept xHE-AAC Encoder Plugin Full Version Installation on Linux

To install the MainConcept xHE-AAC Encoder Plugin for FFmpeg Full version, you must first install the modified FFmpeg version as described in the previous sections. Afterwards, continue here:

1. Unpack the full version plugin tarball, then run the self-extracting executable and accept the EULA:

```
tar xf
mc_ffmpeg_plugin_xheaac_encoder_installer_encrypted_gcc_linux64_x64_<version_id>.tar.bz2

./mainconcept_xheaac_encoder_linux_x64_full_<version_id>.run
```

2. Install the package files according to your Linux base system:

Debian-based Linux:

```
cd mc_ffmpeg_plugins/deb/

sudo dpkg -i mcomx-core_<version_id>_amd64.deb
sudo dpkg -i mc-encxheaac_<version_id>_amd64.deb
sudo dpkg -i mc-encxheaac_<version_id>_amd64.deb
sudo dpkg -i mc-sdk-conf_<version_id>_amd64.deb
sudo dpkg -i mcomx-lic_<version_id>.x86_64.deb

sudo dpkg --force-depends -i codemeter_7.xxx.deb


We recommend the full WIBU runtime installer described above. However, if you require
a CLI only version, you can alternatively install the lite version as described below
and follow the section "1.10 CMU - CodeMeter Universal Support Tool" in WIBU CodeMeter
Administrator Manual from here:

sudo dpkg --force-depends -i codemeter-lite_7.xxx.deb
```

RPM-based Linux:

```
cd mc_ffmpeg_plugins/rpm/

sudo dnf install mcomx-core_<version_id>.x86_64.rpm
sudo dnf install mcomx-encxheaac_<version_id>.x86_64.rpm
sudo dnf install mc-encxheaac_<version_id>.x86_64.rpm
sudo dnf install mc-sdk-conf_<version_id>.x86_64.rpm
sudo dnf install mcomx-lic_<version_id>.x86_64.deb

sudo dnf install codemeter_7.xxx.rpm


We recommend the full WIBU runtime installer described above. However, if you require
a CLI only version, you can alternatively install the lite version as described below
and follow the section "1.10 CMU - CodeMeter Universal Support Tool" in WIBU CodeMeter
Administrator Manual from here:

sudo dnf install codemeter-lite_7.xxx.rpm
```

The MainConcept xHE-AAC Encoder Plugin for FFmpeg is now installed on your computer! You now need to activate the licensed version of the software before it can be used.

4. License Activation

4.1 Online License Activation

When you purchased the full licensed product, you have received a license activation link. Use this link only on the computer where you installed the software with the steps below:

1. Activation requires WIBU-Systems' CodeMeter. This software is installed during the installation process of the full licensed product described above.

2. Verify that **CodeMeter runtime** is running by looking for the CodeMeter icon on your Windows taskbar:

On Linux, check if the CodeMeter daemon process is running:

```
$ ps ax | grep "[C]odeMeter"
```


You can check if CodeMeter Control Center is running correctly on Linux in the menu **Applications > Accessories > CodeMeter Control Center**. You can also run this with the following command line:

```
$ /usr/bin/CodeMeterCC –m
```

To activate the license, you must have an active internet connection. Open a browser on the computer where you installed the software and copy & paste the activation link.

The activation link will open the CodeMeter License Central web page below. Here you choose whether to use a USB hardware dongle (CMDongle) or a software license (CMActLicense) to activate the MainConcept xHE-AAC Encoder Plugin for FFmpeg. In this release, please use the software activation, i.e. the CmActLicense on the right side by clicking it.
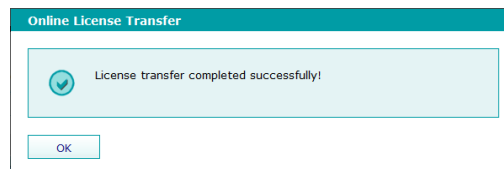
4. The following page will appear on the screen. You should ensure that the MainConcept xHE-AAC Encoder Plugin for FFmpeg is selected. The **Select CMContainer** drop-down menu should show **Get CmContainer** automatically. To proceed with the activation, simply click the **Activate Selected Licenses Now** button.
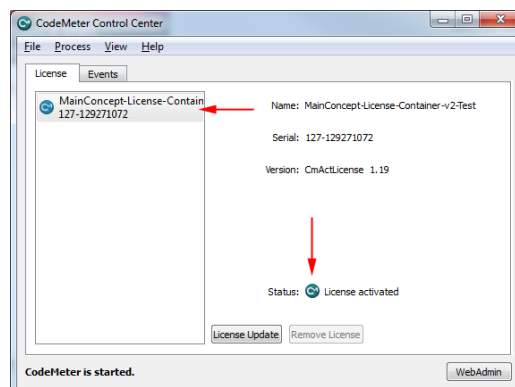

5. If successful, you will get the following notification. Press **OK** to proceed.

6. After a few seconds the status will change to **Activated**. The license is now activated and can be used.

7. If you open **CodeMeter Control Center** you will also see the last activated product as confirmation. The status will change to **License activated**.

8. You will also notice that the CodeMeter icon in your task bar has changed from red to green:

9. In case you have activated more than one license you get a more detailed overview in WebAdmin.

WebAdmin will open in a browser window. By choosing **Container > Licenses** you will get an overview about all installed licenses:
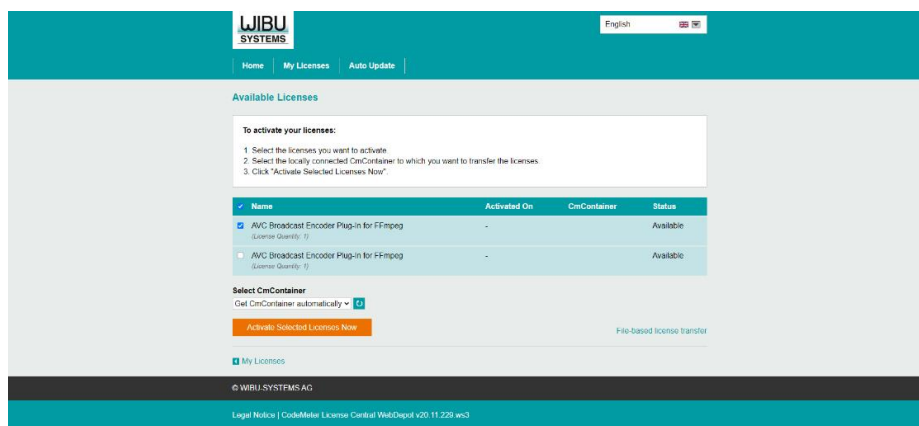

4.2 Offline License Activation

A license can be activated on a system without internet connectivity. However, you still need a system which is online to start the process. But the actual system, where the FFmpeg Plugin is running can remain offline the whole time.
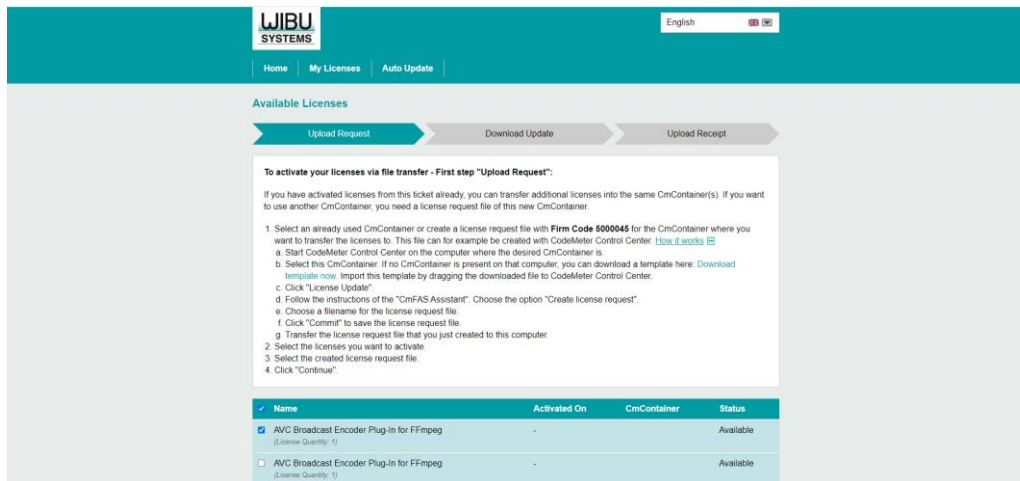
1. On the system with online internet connection, click or copy & paste the Wibu activation link into your default internet browser. A page like the one below will appear on the screen. You might need to click on the **File-based license transfer** link at the bottom right corner.
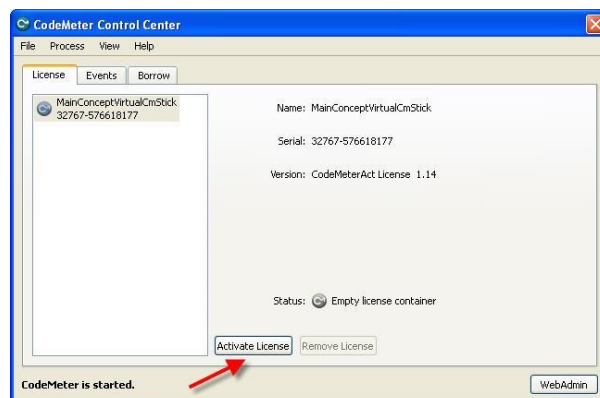
2. In the following page, you need to expand the information by clicking the **How it works** link. Here you can download a Wibu License Container template file to your local hard drive. Click the **Download template now** link to start downloading this License Container. You need to transfer this file to the system where the MainConcept FFmpeg Plugin full version is installed (e.g. using a USB stick).

3. Switch to the offline system where the FFmpeg Plugin is installed and copy the Wibu License Container template file to its local hard drive. Open the CodeMeter Control Center. Import this file by dragging and dropping it into the CodeMeter Control Center. Once this is done, press the **Activate License** button.

4. Confirm the Welcome screen with **Next**.

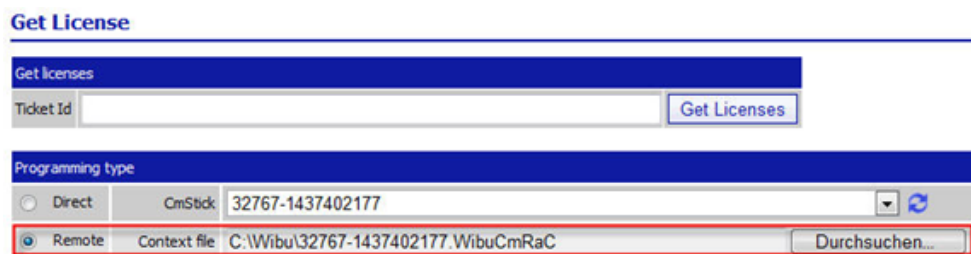5. Tick the option **Create license request** and confirm with **Next**.

6. Select a file name. The dialog will make a suggestion. However, you can enter your own. Please note that the suffix ".WibuCmRaC" is required.

7. Transfer the stored file to a PC with internet connectivity (e.g. using an USB stick).

8. During the purchasing process you received a License Ticket ID. Click or copy and paste the provided link into your browser.

The browser will access the **MainConcept License Center** where the product will automatically show up.

9. Tick **Remote** in the **Programming type** section.

10. Pick the context file (license request) you have created before on your target system. Press **Activate now**.
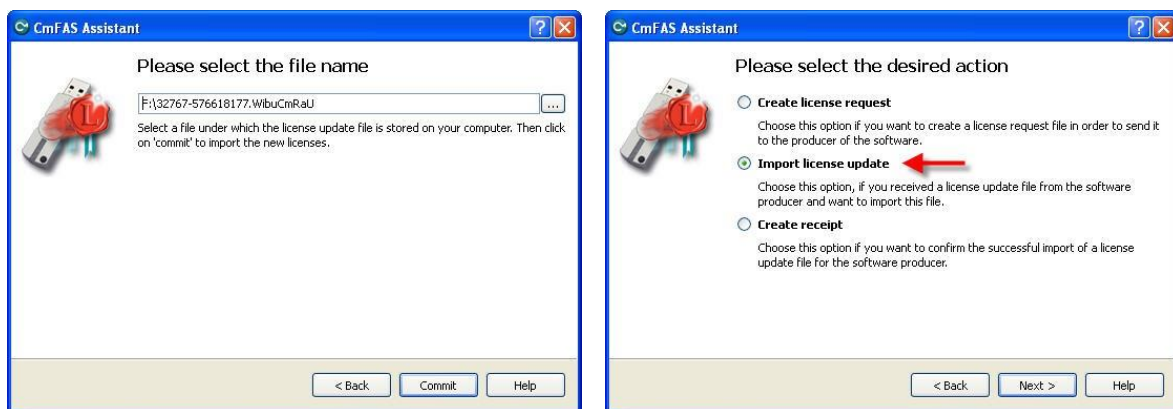

11. Confirm the activation process. After a few seconds, the status will change to **Activated**.

12. The download of the update file ("*.WibuCmRaU") should automatically start. In case of browser problems such as pop-up blocker or extended security settings, please go to the activated item and press **Download update** in the drop-down menu.

13. Transfer the activation file ("*.WibuCmRaU") to your target system where the Plugin for FFmpeg is installed. Open the Control Center again, go to **Activate License** and pick **Import license update** this time, selecting the file you have saved before. Confirming with **Commit** will activate the license.

The license is now activated.

4.3   Offline Activation via Command-Line on Linux

This section describes the process of setting up a license container for the MainConcept FFmpeg Plugins Full versions and installing license updates from a Linux command-line interface, like you would access on an SSH console. The full version product installer package comes with easy-to-use shell-script based tools.

In "activation_tools" folder, there is the following contents:

- RequestLicense.sh
- InstallLicense.sh
- Template/

To work with the tools, please switch to the folder with the `cd` command:

```
cd ./activation_tools
```

Requirements:

For the sake of convenience, we assume you have downloaded and installed an appropriate version of the CodeMeter Runtime for your Linux host and the "codemeter" service is already running. Depending on the installation status, the activation tools may display the following error messages:

```
"cmu tool not available. Please make sure to install CodeMeter Runtime."
```

The message is shown when CodeMeter runtime is not installed. Please make sure to follow the product installation instructions for CodeMeter Runtime. To obtain the latest CodeMeter Runtime installer, please visit: https://www.wibu.com/support/user/user-software.html

```
"codemeter service is not running."
```

The message is shown when CodeMeter runtime is installed but is not running yet. Please execute the following line to start the service:

```
sudo systemctl start codemeter.service
```

After you have purchased a valid license, you receive an activation link that looks like this: http://lc.codemeter.com/41712/depot/get.php?id=xxxxx-xxxxx-xxxxx-xxxxx-xxxxx

The link hosts your purchased license and can be used to activate the FFmpeg Plugin. The license can also be removed from your computer and re-hosted on a different system using this personal activation link.

If you are performing activation on a computer without internet connection or without GUI, the license must be activated on another computer with internet browser and transferred to the offline system by files via SSH or a USB stick.

Activate License:

To start the license transfer process, please execute "RequestLicense.sh" that can be found in the "./activation_tools" folder on the system where the FFmpeg Plugins are installed (i.e. the system without internet connection).

```
./RequestLicense.sh
```

If there is no existing license container, the tool will create a new container which will store your license. If there is already one or more existing license containers, the tool will ask you which one to use. If you are uncertain, type "c" to create a new license container. If this is successful, the activation tool will generate a license request file named with suffix (*_request.WibuCmRaC).

Please send the license request file to a computer with GUI and internet connection to open the activation link (http://lc.codemeter.com/41712/depot/get.php?id=xxxxx-xxxxx-xxxxx-xxxxx-

) in the browser and update the license container there. You need to proceed with file-based license transfer by selecting "Pick a license request file (*.WibuCmRaC) of another CmContainer" and proceed with the activation. Once your license request is processed, you will receive a license update file (.WibuCmRaU) in return.

Now transfer the license update file to the offline system where the MainConcept FFmpeg Plugins are present. You can install the license update file with the following parameter:
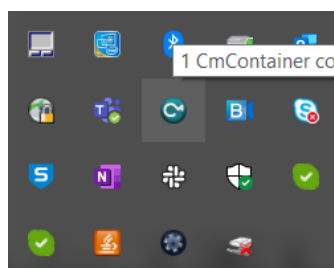
```
./InstallLicense.sh <license update file(.WibuCmRaU)>
```

If the license is imported successfully, the tool will generate a license receipt file with suffix (*_receipt.WibuCmRaC). The created license receipt can be uploaded back to License Central (i.e. the system with the online connection) to finish the transaction.

4.4   Network License Usage

You can run the MainConcept FFmpeg Plugins also as a network server license in your LAN (Local Area Network). This requires some additional steps to your regular installation.
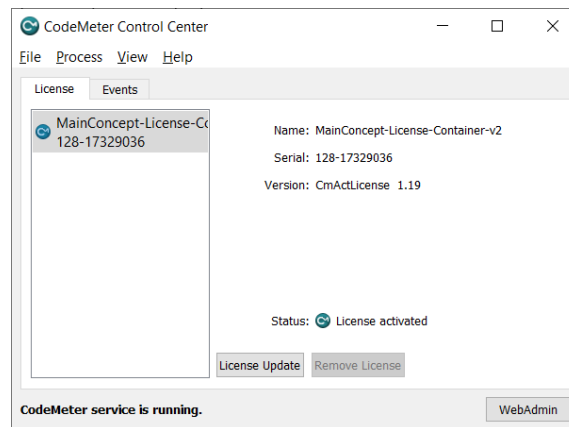
1. Install the corresponding MainConcept FFmpeg Plugin full version, including Wibu CodeMeter.

2. Download Wibu CodeMeter Runtime installer file from the Wibu Systems website separately: https://www.wibu.com/support/user/user-software.html. Install the CodeMeter Runtime on the system that should be used as the network license server for managing your activations (License Server).

3. Activate the FFmpeg Plugin on the system that should work as a network license server, i.e. on the system where you have just installed Wibu CodeMeter Runtime separately. Write down the IP address of the system you will use as a License Server.

4. On the License Server, open the **CodeMeter Control Center** by clicking the **CmContainer** icon in the taskbar.
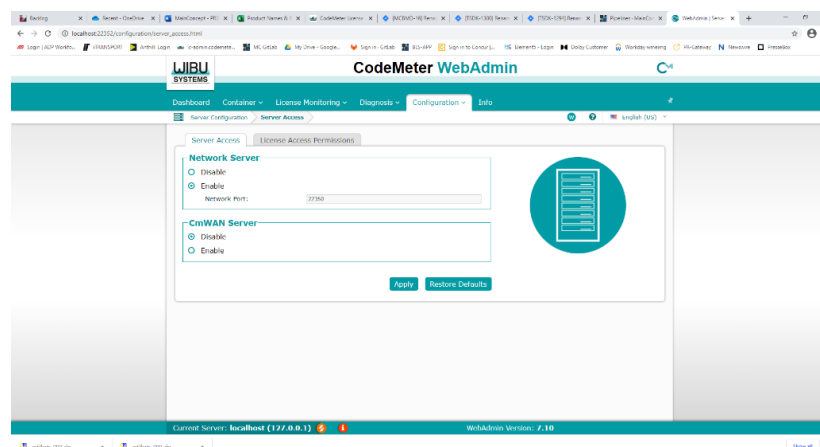
5. In the CodeMeter Control Center, open the **WebAdmin** by clicking the corresponding button or go to **File > WebAdmin**.

6. Your default internet browser will open the Wibu Systems **CodeMeter WebAdmin**. Go to **Configurations > Server > Server Access**. Set the radio button under **Network Server** to **Enable**. Leave the **Network Port** default settings. When you are done, click the **Apply** button.
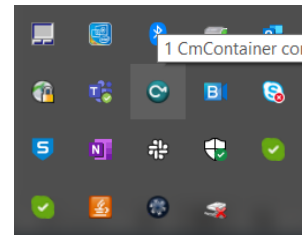

Now switch to the system where the FFmpeg Plugin is installed and start working with it. When you now multiplex a file, the demo restrictions should be removed and the FFmpeg Plugin works as full version.

If you still see the muxing limitations in the processing now, please additionally follow the steps 7 – 10 outlined below.
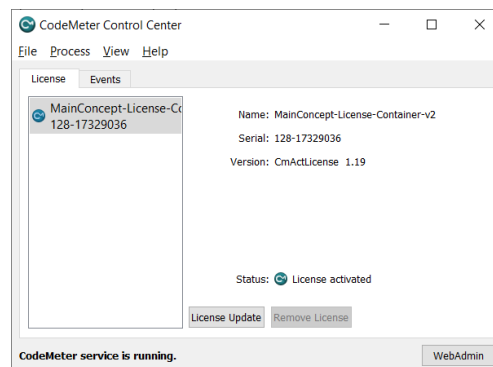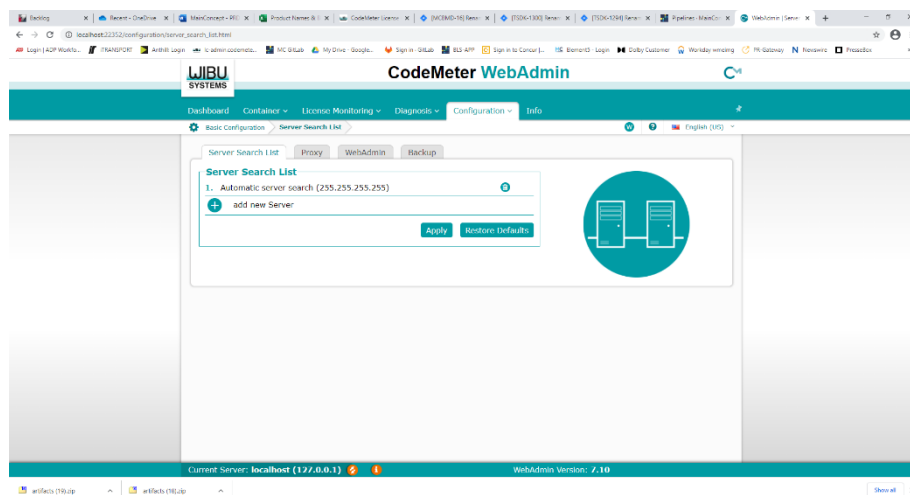
7. Switch to the system where the FFmpeg Plugin full version is installed. Open the **CodeMeter Control Center** by clicking the **CmContainer** icon in the taskbar.

8. In the CodeMeter Control Center, open the **WebAdmin** by clicking the corresponding button or go to **File > WebAdmin**.
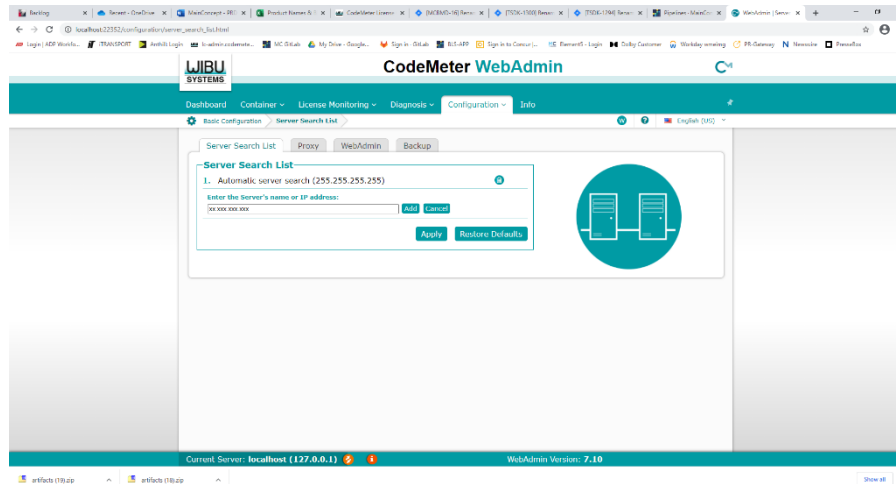

9. Your default internet browser will open the Wibu Systems **CodeMeter WebAdmin**. Go to **Configurations > Basic > Server Search List**. Click the **add new server** button. Enter the IP address of your network License Server. Click the **Add** button. When you are done, click the **Apply** button.

10. Now switch to the system where the FFmpeg Plugin is installed and start working with it. When you now multiplex a file, the demo restrictions should be removed and the FFmpeg Plugin works as full version.

5. Features

New Features in xHE-AAC Encoder Plugin 3.3

- Updated to Fraunhofer xHE-AAC software encoder library v04.05.05.

New Features in xHE-AAC Encoder Plugin 3.2

- Plugin now also works with latest FFmpeg 7.0 "Dijkstra".

New Features in xHE-AAC Encoder Plugin 3.0

- Plugin now also works with latest FFmpeg 6.0 "Von Neumann".
- Updated to Fraunhofer xHE-AAC software encoder library v04.05.00.
- Added version and copyright information to OMX plugins and common FFmpeg plugins libraries.

New Features in xHE-AAC Encoder Plugin 2.3

- Support for live xHE-AAC encoding workflows.
- Updated to Fraunhofer xHE-AAC software encoder library v04.03.00.

New Features in xHE-AAC Encoder Plugin 2.2

- Updated underlying Fraunhofer xHE-AAC software encoder library

New Features in xHE-AAC Encoder Plugin 2.0

- Use Fraunhofer's industry leading xHE-AAC software encoder natively in FFmpeg by using a MainConcept plugin

- Support for xHE-AAC as well as legacy Low Complexity AAC, High-Efficiency AAC v1 and High-Efficiency AAC v2 audio formats
- Support for on-demand (file-to-file) xHE-AAC encoding workflows
- Support for on-demand (file-to-file) and live legacy AAC encoding workflows
- Encoding for MPEG-DASH and Apple HLS compliant streaming use-cases
- Best-in-class audio featuring bitrates of 12-500 kb/s for stereo
- Seamless audio bitrate switching for MPEG-DASH and Apple HLS
- Mandatory loudness and dynamic range control
- Seamlessly integrates with other MainConcept Video Encoder Plugins for FFmpeg but also with FFmpeg's built-in video encoders
- Fully compliant with FFmpeg's built-in MP4 multiplexer, incl. fragmented MP4
- The plugin's "-omx_name" changed from "OMX.MainConcept.EncHeaac.Audio" to "OMX.MainConcept.enc_xheaac.audio" (compared to Beta release).

6. Resolved Issues

Resolved issues in xHE-AAC Encoder Plugin 3.3:

- An issue that was causing a clicking noise during encoding at low bitrates was fixed.

Resolved issues in xHE-AAC Encoder Plugin 2.1:

- Several improvements in loudness measurement.
- General DRC performance optimizations.

7. Known Issues

- [MCFFMPEG-16] Once you have one full version MainConcept FFmpeg Plugin installed, it is not possible to use the other plugins in demo mode anymore.

8. Customer Care

For feedback and assistance with using the MainConcept xHE-AAC Encoder Plugin for FFmpeg, please contact our Customer Care team at apps.support@mainconcept.com.

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