

VVC Encoder Plugin for FFmpeg 3.1

Release Notes

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1. General Overview

FFmpeg is often used in professional content production for file-based transcoding as well as live use cases. The VVC Encoder Plugin for FFmpeg is a convenient way to seamlessly integrate MainConcept's industry-leading and professional codec libraries within an FFmpeg workflow.

2. Software Requirements

To use MainConcept VVC 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 14.04 LTS (glibc2.25), CentOS 7.9 (64-bit)

Software Requirements:

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

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

To run the MainConcept VVC Encoder Plugin for FFmpeg, the following software packages must be installed in this order:

- 1) Modified FFmpeg version (FFmpeg 4.4 or 6.0) 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 VVC Encoder Plugin for FFmpeg Demo version installer from the MainConcept website: <https://www.mainconcept.com/>. It works for both FFmpeg 4.4 and 6.0.
- 3) For an already licensed plugin, install the full version of the MainConcept VVC Encoder Plugin for FFmpeg after purchase. It also works for both FFmpeg 4.4 and 6.0.



NOTE:

The demo version of the MainConcept VVC Encoder Plugin for FFmpeg is fully functional. It only adds a watermark to the processed video.

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 VVC Encoder Plugin for FFmpeg on Windows, the following software packages must be installed in this order:

1. Install modified FFmpeg
2. Install MainConcept VVC Encoder Plugin for FFmpeg Demo version
3. Install licensed MainConcept VVC Encoder Plugin for FFmpeg Full version (optional)

3.1.1 Modified FFmpeg 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_4.4-omx_win64_3.0.0.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 VVC Encoder Plugin Demo or the MainConcept VVC Encoder Plugin for FFmpeg Full version to this folder later.

4. You can also 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 next dialog box appears, click **Finish** to complete the setup.

FFmpeg is now installed on your computer!

3.1.2 FFmpeg Plugins Demo Installation on Windows

You must now install the MainConcept VVC Encoder Plugin for FFmpeg Demo version for evaluation. It must be installed to the same location where you have installed FFmpeg before. This step is also required if you purchased a full license of the plugin:

7. Run the “mainconcept_ffmpeg_plugin_demo_enc_vvc.exe” 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. You can also 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 next dialog box appears, click **Finish** to complete the setup.

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

3.1.3 MainConcept VVC Encoder Plugin Full Version Installation on Windows

To install the MainConcept VVC Encoder Plugin for FFmpeg Full version, you must first install the evaluation version as described in the previous section. Afterwards, continue here.

1. If you haven't installed the modified FFmpeg, follow steps 1 – 6 from the previous chapter.
2. Run the “mainconcept_vvc_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 VVC Encoder Plugin must be installed to the same folder where FFmpeg was installed before. Click **Next** to proceed.
5. You can also choose a Start Menu folder. We recommend using the default location. Click **Next** to proceed.



- When the next dialog box appears, click **Finish** to complete the setup.

The MainConcept VVC 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 VVC Encoder Plugin for FFmpeg on Linux the following software packages must be installed in this order:

1. Install modified FFmpeg
2. Install MainConcept VVC Encoder Plugin for FFmpeg Demo version
3. Install licensed MainConcept VVC Encoder Plugin for FFmpeg Full version (optional)

3.2.1 Modified FFmpeg 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_gcc_linux64_x64_<version_id>.tar.bz2
./ffmpeg_static_4.4-omx_linux64_3.0.0.run
```

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

Debian-based Linux:

```
sudo dpkg -i ffmpeg_omx/deb/ffmpeg-static_4.4-0omx.0~3992_amd64.deb
```

RPM-based Linux:

```
sudo yum localinstall ffmpeg_omx/rpm/ffmpeg-static-4.4-0omx.0.3992.el7.x86_64.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_vvc --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 --enable-omx_enc_vvc"

FFmpeg is now installed on your computer.

3.2.2 FFmpeg Plugins Demo Installation on Linux

You must now install the MainConcept VVC Encoder Plugin for FFmpeg Demo version for evaluation. This step is also required if you purchased a full license of the plugin:

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

```
tar xf mc_ffmpeg_plugins_demo_installer_gcc_linux64_x64_sfx-<build_id>.tar.bz2
./mainconcept_enc_vvc_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 -f mcomx-core_<version_id>_amd64.deb
sudo dpkg -i -f mcomx-encvvc_<version_id>_amd64.deb
sudo dpkg -i -f mc-encvvc-demo_<version_id>_amd64.deb
sudo dpkg -i -f 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 yum localinstall mcomx-core_<version_id>.x86_64.rpm
sudo yum localinstall mcomx-encvvc_<version_id>.x86_64.rpm
sudo yum localinstall mc-encvvc-demo_<version_id>.x86_64.rpm
sudo yum localinstall mc-sdk-conf_<version_id>.x86_64.rpm
```

Alternatively, you can install all at once:

```
sudo yum localinstall *
```

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



3.2.3 MainConcept VVC Encoder Plugin Full Version Installation on Linux

To install the MainConcept VVC 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_vvc_encoder_installer_gcc_linux64_x64_sfx-  
installer4_b4003.tar.bz2  
  
./mainconcept_vvc_encoder_plugin_linux64_full_3.0.0.run
```

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

Debian-based Linux:

```
sudo dpkg --force-depends -i codemeter_7.0.3918.500_amd64.deb  
sudo dpkg -i mc-encvvc_<version_id>_amd64.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_7.0.3918.500_amd64.deb
```

RPM-based Linux:

```
sudo yum localinstall CodeMeter-7.0.3918-500.x86_64.rpm  
sudo yum localinstall mc-encvvc-<version_id>.x86_64.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 yum localinstall CodeMeter-lite-7.0.3918-500.x86_64.rpm
```

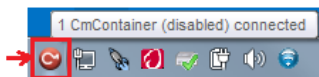
The MainConcept VVC Encoder Plugin for FFmpeg is now installed on your computer. You now need to activate the licensed version of the software before it can be used.

4. License Activation

4.1 Online License Activation

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

1. Activation requires WIBU-Systems' CodeMeter. This software is installed during the installation process of the fully 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"
```

```
[thomas@centos8-1 linux-x64]$ ps ax | grep "[C]odeMeter"
6536 ?        Ssls    0:00 /usr/sbin/CodeMeterLin -f
```

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



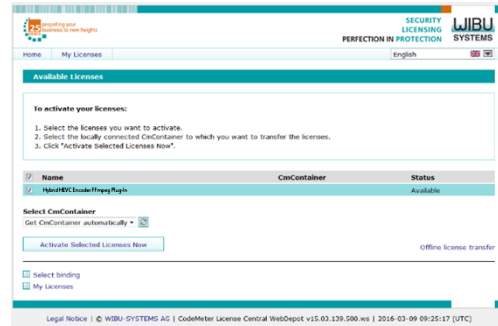
The activation link will open the CodeMeter License Central web page below. Here you can choose whether to use a USB hardware dongle (CMDongle) or a software license (CMActLicense) to activate the VVC Encoder Plugin for FFmpeg. In this release, use the software activation, i.e. the CmActLicense on the right side by clicking it.



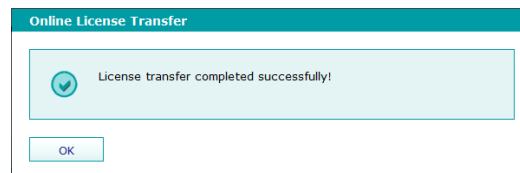
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- The following page will appear on the screen. You should ensure that the MainConcept VVC Encoder Plugin for FFmpeg is selected. The **Select CMContainer** drop-down menu should show **Get CmContainer** automatically. To proceed with the activation, simply click the **Activate Selected Licenses Now** button.



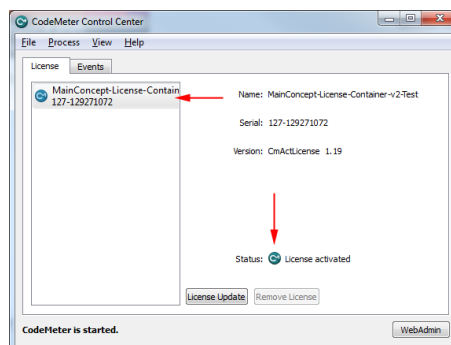
- If successful, you will get the following notification. Press **OK** to proceed.



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



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



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



9. If you activated more than one license you get a more detailed overview in WebAdmin.



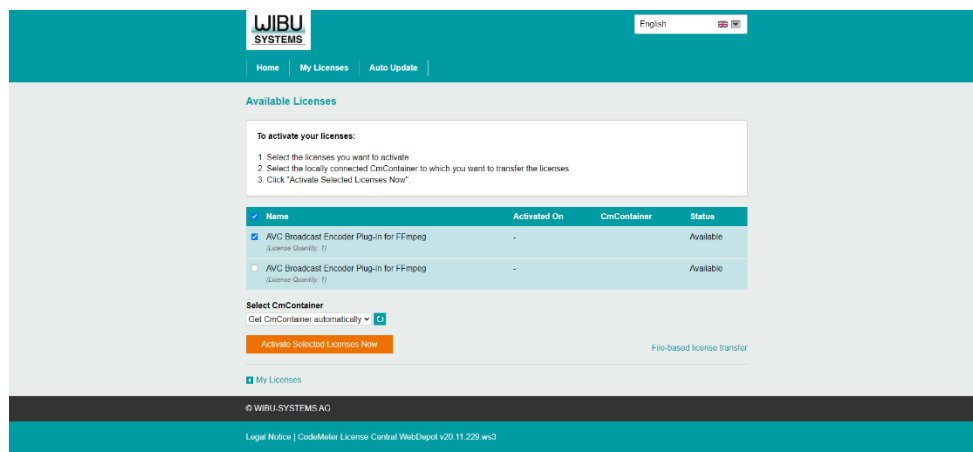
WebAdmin will open in a browser window. By choosing **Container > Licenses** you will get an overview about all installed licenses:

The screenshot shows the CodeMeter WebAdmin interface. At the top, there's a navigation bar with 'Dashboard', 'Container', 'License Monitoring', 'Diagnosis', 'Configuration', and 'Info'. Below this, a breadcrumb trail shows 'All Container' > 'MainConcept-License-Container-v2' > '(127-129271072)'. The main content area displays details for 'MainConcept-License-Container-v2' with ID '127-129271072' and 'CmActLicense 1.19'. A table lists licenses, with one entry for 'MainConcept GmbH' (Product Code 5000045) which is a 'CodeMeter Evaluation License - not for commercial use!'. Below this, a detailed table shows the license for 'Hybrid HEVC Encoder FFmpeg Plug-In' (Product Code 6000) with a unit counter of 'n/a', valid until 'n/a', a license quantity of '1', and a feature map of 'n/a'.

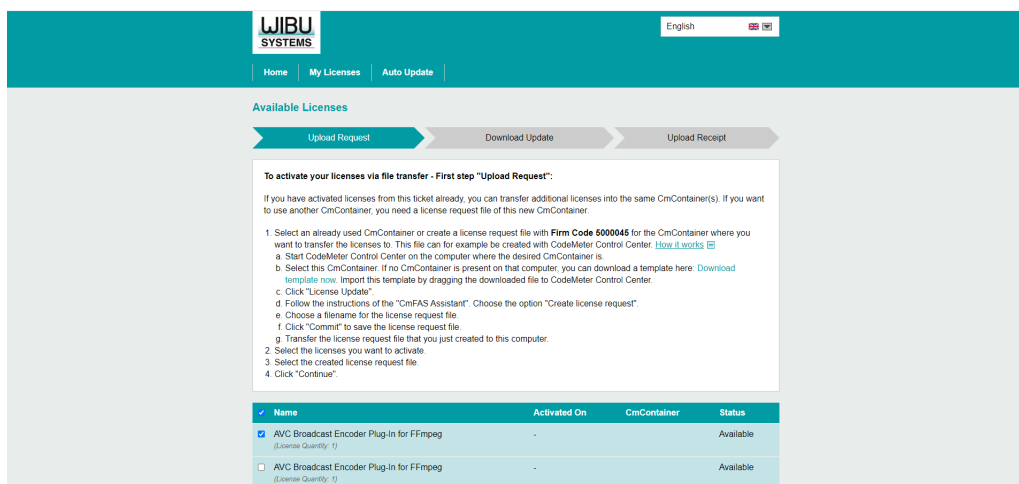
4.2 Offline License Activation

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 and 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.



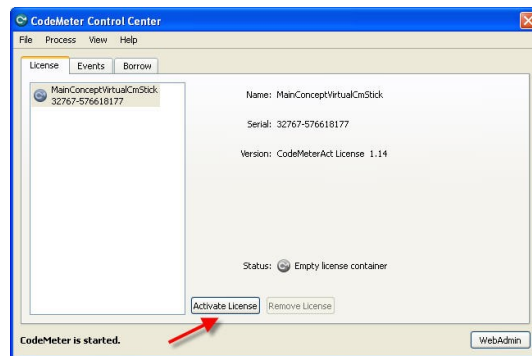
2. In the following page, you need to expand the information by clicking the **How it works** link. Here you can download a Wibu License Container template file to your local hard drive. Click the **Download template now** link to start downloading this License Container. You need to transfer this file to the system where the MainConcept FFmpeg Plugin full version is installed (e.g. using a USB stick).



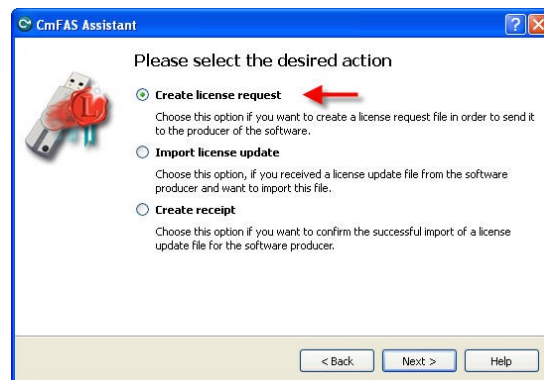
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- Switch to the offline system where the FFmpeg Plugin is installed and copy the Wibu License Container template file to its local hard drive. Open the CodeMeter Control Center. Import this file by dragging and dropping it into the CodeMeter Control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



- Confirm the Welcome screen with **Next**.
- Tick the option **Create license request** and confirm with **Next**.



- Select a file name. The dialog will make a suggestion. However, you can enter your own. Note that the suffix ".WibuCmRaC" is required.
- Transfer the stored file to a PC with internet connectivity (e.g. using a USB stick).
- 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.

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



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

The 'Get License' window contains a 'Get licenses' section with a 'Ticket Id' field and a 'Get Licenses' button. Below this is the 'Programming type' section with two radio buttons: 'Direct' and 'Remote'. The 'Remote' option is selected. Next to it is a 'Context file' field containing the path 'C:\Wibu\32767-1437402177.WibuCmRaC'. A 'Durchsuchen...' button is to the right of the field. The 'Ticket Id' field contains the value '32767-1437402177'.

- Confirm the activation process. After a few seconds, the status will change to **Activated**.
- The download of the update file ("*.WibuCmRaU") should automatically start. If pop-up blockers or extended security settings appear in your browser, go to the activated item and press **Download update** in the drop-down menu.

The 'Your licenses' window shows a table with one license entry: 'AVC Encoder FFmpeg Plug-In'. The status is 'Activated'. To the right of the status are two buttons: 'Download update' and 'Send receipt'. A red arrow points to the 'Download update' button. Below the buttons is a 'Display mode:' label and a dropdown menu.

- 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 first screenshot shows the 'Please select the file name' dialog box. It has a text field with the file path 'F:\32767-576618177.WibuCmRaU' and a 'Commit' button. The second screenshot shows the 'Please select the desired action' dialog box. It has three radio buttons: 'Create license request', 'Import license update' (which is selected and has a red arrow pointing to it), and 'Create receipt'. Both dialog boxes have '< Back', 'Commit', and 'Help' buttons at the bottom.

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 the "activation_tools" folder, you will find the following contents:

- RequestLicense.sh
- InstallLicense.sh
- Template/

To work with the tools, 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. Ensure to follow the product installation instructions for CodeMeter Runtime. To obtain the latest CodeMeter Runtime installer, 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. 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.

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If you are performing activation on a computer without internet connection or without GUI, the license must be activated on another computer with an 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).

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-xxxxx>) in the browser and update the license container there. You need to proceed with a 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)>
```

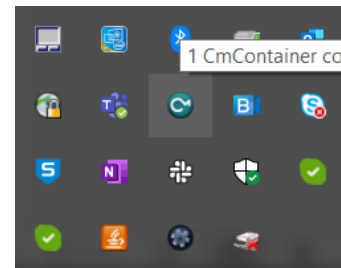
If the license is imported successfully, the tool will generate a license receipt file with the suffix (*_receipt.WibuCmRaC). The license receipt created can be uploaded back to License Central (i.e. the system with the online connection) to finish the transaction.



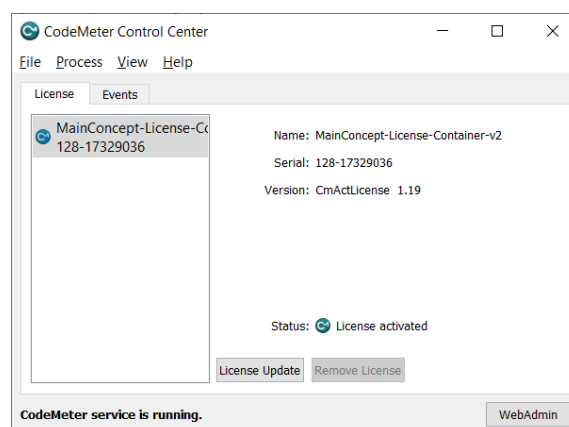
4.4 Network License Usage

You can run the MainConcept FFmpeg Plugins also as a network server license in your LAN (Local Area Network). This requires some additional steps for 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.



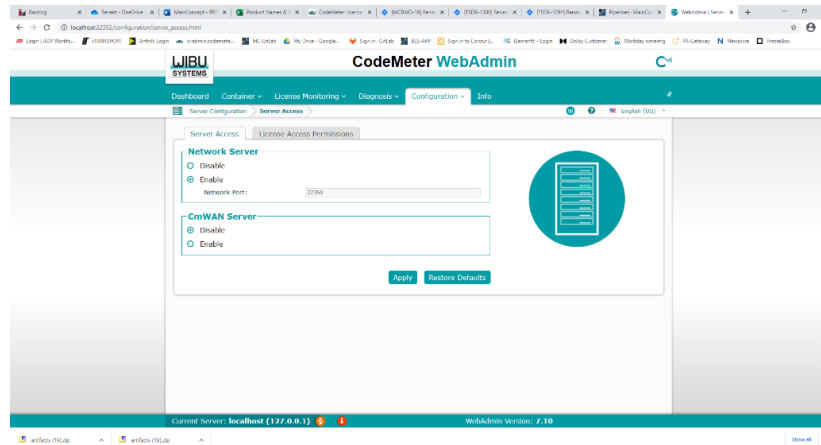
5. In the CodeMeter Control Center, open the **WebAdmin** by clicking the corresponding button or go to **File > WebAdmin**.



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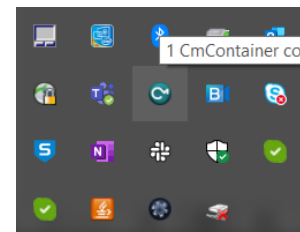
6. Your default internet browser will open the Wibu Systems **CodeMeter WebAdmin**. Go to **Configurations > Server > Server Access**. Set the radio button under **Network Server** to **Enable**. Leave the **Network Port** default settings. When you are done, click the **Apply** button.



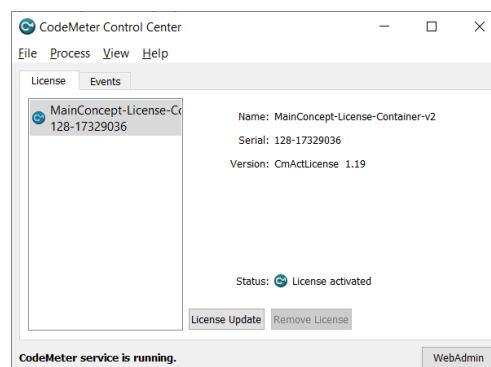
Now switch to the system where the FFmpeg Plugin is installed and start working with it. When you now encode a file, the demo restrictions should be removed and the FFmpeg Plugin works as full version.

If you still see the watermark in the encoded video 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.



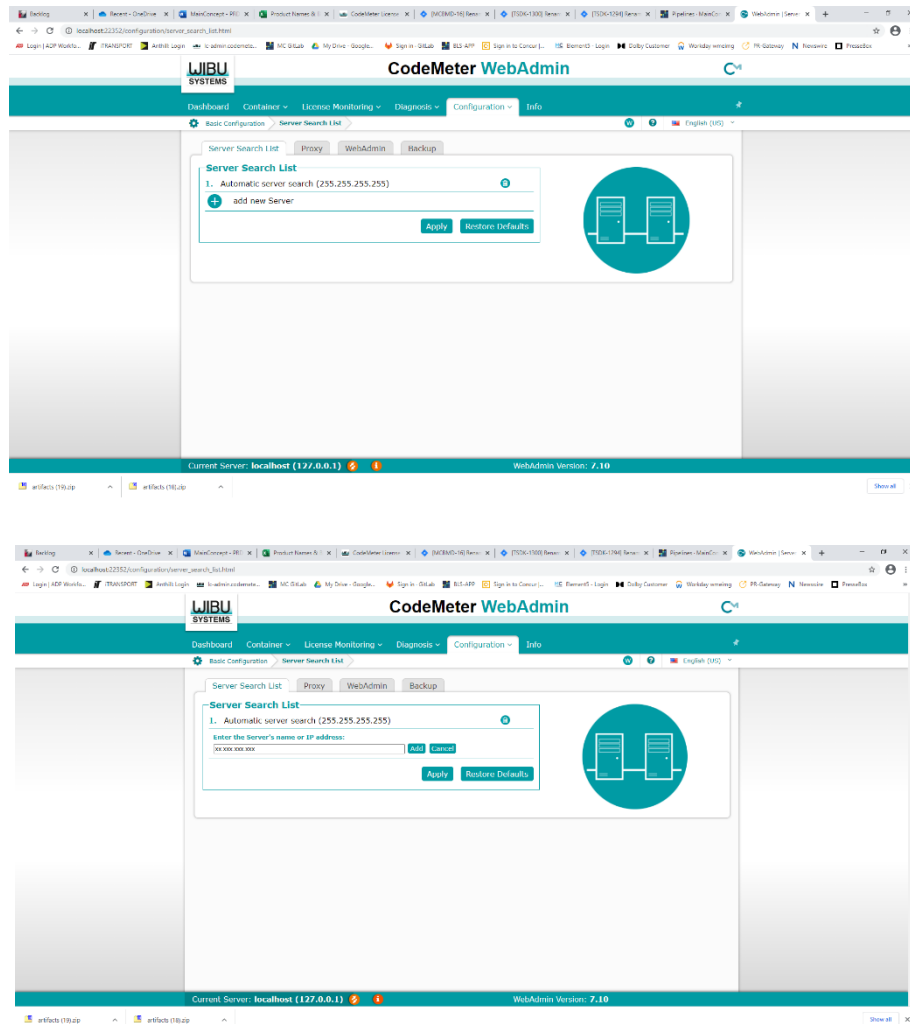
8. In the CodeMeter Control Center, open the **WebAdmin** by clicking the corresponding button or go to **File > WebAdmin**.



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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 encode a file, the demo restrictions should be removed and the FFmpeg Plugin works as full version.



4. Features

New Features in VVC Encoder Plugin 3.1:

- Plugin now uses the MainConcept VVC/H.266 Encoder from Codec SDK 14.3.

New Features in VVC Encoder Plugin 3.0:

- Plugin now also works with latest FFmpeg 6.0 "Von Neumann".
- Plugin now uses the MainConcept VVC/H.266 Encoder from Codec SDK 14.2.
- Temporal filtering, adaptive quantization and RDOQ support in VVC/H.266 video encoder, resulting in compression efficiency improvements of up to 15%.
- Added version and copyright information to OMX plugins and common FFmpeg plugins libraries.

New Features in VVC Encoder Plugin 2.3:

- Plugin now uses the MainConcept VVC/H.266 Encoder from Codec SDK 14.0.
- Implemented a "perf_level" parameter that can be directly used on the FFmpeg command-line to achieve an optimal balance between quality and performance.

New Features in VVC Encoder Plugin Beta 2:

- Updated version of the MainConcept VVC/H.266 Encoder.
- Significant speed and quality improvements – approximate improvements are: 13% BD-rate increase, 40% speedup for ConstQ, 8% BD-rate increase and 20% speedup for VBR)
- Added VBR HRD support
- Added Main and High tier and levels up to 6.3 support
- SAO (Sample Adaptive Offset) filter
- Default value for "profile" option has changed from "1" to "0" in Beta 2

New Features in VVC Encoder Plugin Beta 1:

- Use MainConcept's industry leading VVC/H.266 software encoder natively in FFmpeg
- Suitable for live and VOD workflows
- VVC/H.266 Main 10 profile, 8-bit and 10-bit, 4:2:0 support
- Coding tools for up to 8K resolution
- HDR signaling
- VVC as future format embedded in SBTVD and DVB specifications
- Tune MainConcept codec features via a separate config file

5. Known Issues

- [MCFFMPEG-16] Once you have one full version MainConcept FFmpeg Plugin installed, it is no longer possible to use the other plugins in demo mode.

6. Customer Care

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

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