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# Kaldi SR Plugin

## Administrator Guide

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# 1 Overview

This guide describes how to obtain and install binary packages for the Kaldi Speech Recognition (KaldiSR) plugin to the UniMRCP server on Debian-based Linux distributions. The document is intended for system administrators and developers.

## 1.1 Applicable Versions

Instructions provided in this guide are applicable to the following versions.

 UniMRCP 1.5.0 and above  
UniMRCP KaldiSR Plugin 1.0.0 and above

## 1.2 Supported Distributions


UniMRCP deb packages are currently available for x86\_64 (64-bit) architecture only.

Operating System	Released	End of Support
Ubuntu 16.04 LTS (xenial)	February 2018	March 2021
Ubuntu 18.04 LTS (bionic)	May 2019	TBA
Ubuntu 20.04 LTS (focal)	March 2021	TBA

Note: packages for other distributions can be made available upon request. For more information, contact [services@unimrcp.org](mailto:services@unimrcp.org).

## 1.3 Authentication

UniMRCP binary packages are available to authenticated users only. In order to register a free account with UniMRCP, please visit the following page.

 <https://www.unimrcp.org/profile-registration>

Note: a new account needs to be verified and activated prior further proceeding.

## 2 Installing Deb Packages Using Apt-Get

Using the APT package handling utility (`apt-get`) is recommended for installation of UniMRCP binary packages.

### 2.1 Repository Configuration

Supply login information by creating a file `/etc/apt/auth.conf.d/unimrcp.conf` containing the following entry.

```
machine unimrcp.org
login username
password password
```

Note: the *username* and *password* fields must be replaced with the corresponding account credentials.

Configure a repository by creating a file `/etc/apt/sources.list.d/unimrcp.list` containing the following entry.

```
deb [arch=amd64] https://unimrcp.org/repo/apt/ distr main
```

Note: the *distr* field must be replaced with the corresponding distribution code name such as *xenial*, *bionic*, *focal*, etc. To determine the distribution code, use ``lsb_release -cs``.

### 2.2 GnuPG Key

For verification of binary packages, UniMRCP provides a public GnuPG key, which can be retrieved and installed as follows.

```
wget -O - https://unimrcp.org/keys/unimrcp-gpg-key.public | sudo apt-key add -
```

### 2.3 Repository Update

In order to check for updates and apply the changes in the APT configuration, use the following command.

```
sudo apt-get update
```

## 2.4 KaldiSR Plugin Installation

In order to install the KaldiSR plugin, including all the dependencies, use the following command.

```
sudo apt-get install unimrcp-kaldi-sr
```

As a result, *apt-get* will check and prompt to download all the required packages by installing them in the directory */opt/unimrcp*.

In order to install the additional data files for the sample client application *umc*, the following command can be used.

```
sudo apt-get install umc-addons
```

Note: this package is optional and provides additional data which can be used for validation of basic setup.

# 3 Installing Deb Packages Manually

UniMRCP deb packages can be installed manually using the *dpkg* utility. Note, however, that the system administrator should take care of package dependencies and install all the packages in appropriate order.

The deb packages have the following naming convention:

```
$packagename_${universion}-${distr}_${arch}.deb
```

where

- *packagename* is the name of a package
- *universion* is the UniMRCP version
- *distr* is the distribution code name (trusty, xenial, ...)
- *arch* is the architecture (amd64, i386, all, ...)

## 3.1 Package List

The following is a list of UniMRCP deb packages required for the installation of the KaldiSR plugin.

Package Name	Description
<b>unimrcp-kaldi-sr</b>	KaldiSR plugin to the server.
<b>unilibevent</b>	UniMRCP edition of the libevent library.
<b>umc-addons</b>	Sample en-US data files used with umc. [Optional]
<b>unilicnodegen</b>	Node information retrieval tool, required for license deployment.
<b>unimrcp-server</b>	Shared library and application of the server.
<b>unimrcp-client</b>	Shared libraries and sample applications of the client. [Optional]
<b>unimrcp-demo-plugins</b>	Set of demo plugins to the server. [Optional]
<b>unimrcp-common</b>	Data common for the client and the server.
<b>uniapr</b>	UniMRCP edition of the Apache Portable Runtime (APR) library.

<b>uniapr-util</b>	UniMRCP edition of the Apache Portable Runtime Utility (APR-Util) library.
<b>unisofia-sip</b>	UniMRCP edition of the Sofia SIP library.

## 3.2 Package Installation Order

Packages for APR, APR-Util and Sofia-SIP libraries must be installed first.

```
sudo dpkg --install uniapr_${saprversion}-${distr}_${sarch}.deb
sudo dpkg --install uniapr-util_${sapuversion}-${distr}_${sarch}.deb
sudo dpkg --install unisofia-sip_${sofiaversion}-${distr}_${sarch}.deb
```

Then, a package containing common data for the client and the server, and a package for the server should follow.

```
sudo dpkg --install unimrcp-common_${suniversion}-${distr}_${sarch}.deb
sudo dpkg --install unimrcp-server_${suniversion}-${distr}_${sarch}.deb
```

Next, a package containing the utility tool *unilicnodegen*, required for license deployment.

```
sudo dpkg --install unilicnodegen_${stoolversion}-${distr}_${sarch}.deb
```

Next, a package containing the libevent library.

```
sudo dpkg --install unilibevent_${libeventversion}-${distr}_${sarch}.deb
```

Finally, a package containing the KaldiSR plugin should follow.

```
sudo dpkg --install unimrcp-kaldi-sr_${suniversion}-${distr}_all.deb
```

# 4 Obtaining License

The KaldiSR plugin to the UniMRCP server is a commercial product, which requires a license file to be installed.

## 4.1 License Type

The following license types are available:

- Trial
- Production
- Test and Development

## 4.2 Node Information

The license files are bound to a node the product is installed on. In order to obtain a license, the corresponding node information needs to be retrieved and submitted for generation of a license file.

Use the installed tool *unilicnodegen* to retrieve the node information.

```
sudo /opt/unimrcp/bin/unilicnodegen
```

As a result, a text file *uninode.info* will be saved in the current directory. Submit the file *uninode.info* for license generation to [services@unimrcp.org](mailto:services@unimrcp.org) by mentioning the product name in the subject.

## 4.3 License Installation

The license file needs to be placed into the directory */opt/unimrcp/data*.

```
sudo cp umskaldisr_*.lic /opt/unimrcp/data
```



# 5 Configuring Server and Plugin

## 5.1 Plugin Factory Configuration

In order to load the KaldiSR plugin into the UniMRCP server, open the file *unimrcpserver.xml*, located in the directory */opt/unimrcp/conf*, and add the following entry under the XML element *<plugin-factory>*. Disable other recognition plugins, if available. The remaining demo plugins might also be disabled, if not installed.

```
<!-- Factory of plugins (MRCP engines) -->
<plugin-factory>
  <engine id="Demo-Synth-1" name="demosynth" enable="true"/>
  <engine id="Demo-Recog-1" name="demorecog" enable="false"/>
  <engine id="Demo-Verifier-1" name="demoverifier" enable="true"/>
  <engine id="Recorder-1" name="mrcpreorder" enable="true"/>
  <engine id="Kaldi-SR-1" name="umskaldisr" enable="true"/>
</plugin-factory>
```

## 5.2 RTP Configuration

In order to support audio data sampled at 16 kHz, the corresponding codecs needs to be specified in the configuration file *unimrcpserver.xml* under the XML element *<rtp-settings>* as follows.

```
<rtp-settings id="RTP-Settings-1">
  <codecs own-preference="false"> PCMU PCMA L16/96/8000 telephone-event/101/8000
    PCMU/97/16000 PCMA/98/16000 L16/99/16000 telephone-
    event/102/16000</codecs>
</rtp-settings>
```

For the basic verification test to work, similar settings should be specified in the client configuration file *unimrcpclient.xml* as well.

```
<rtp-settings id="RTP-Settings-1">
  <codecs>PCMU PCMA L16/96/8000 telephone-event/101/8000 PCMU/97/16000
    PCMA/98/16000 L16/99/16000 telephone-event/102/16000</codecs>
</rtp-settings>
```

## 5.3 Logger Configuration

In order to enable log output from the plugin and set filtering rules, open the configuration file *logger.xml*, located in the directory */opt/unimrcp/conf*, and add the following entry under the element *<sources>*.

```
<source name="KALDISR-PLUGIN" priority="INFO" masking="NONE"/>
```

## 5.4 KaldiSR Plugin Configuration

The configuration file of the plugin is located in `/opt/unimrcp/conf/umskaldisr.xml`. Default settings should be sufficient for generic use.

Note that, by using the default configuration settings, an instance of the Kaldi GStreamer server is supposed to be running on the same host as the UniMRCP server, having the following attributes.

```
<kaldi-server-pool>  
  <kaldi-server language="en-US" sampling-rate="16000" instance-count="auto"  
address="127.0.0.1" port="8080"/>  
</kaldi-server-pool>
```

Installation of the Kaldi GStreamer server is not covered in this document.

Refer to the *Usage Guide* for more information.

# 6 Validating Setup

Validate your setup by using the sample UniMRCP client and server applications on the same host. The default configuration and data files should be sufficient for a basic test.

## 6.1 Launching Server

Note: an instance of the Kaldi GStreamer server needs to be running prior starting the UniMRCP server.

Launch the UniMRCP server application.

```
cd /opt/unimrcp/bin
sudo ./unimrcpserver
```

In the server log output, check whether the plugin is normally loaded.

```
[INFO] Load Plugin [Kaldi-SR-1] [/opt/unimrcp/plugin/umskaldisr.so]
```

Next, check for the license information.

```
[NOTICE] UniMRCP KALDISR License

-product name:  umskaldisr
-product version: 1.0.0
-license owner:  -
-license type:   trial
-issue date:    2018-02-05
-exp date:     2018-03-07
-channel count: 2
-feature set:   0
```

Next, make sure that the plugin is successfully connected to the Kaldi GStreamer server.

```
[INFO] Received WS msg [57 bytes]
{"num_workers_available": 2, "num_requests_processed": 0}
[INFO] Set instance count to 2 for <127.0.0.1:8080>
```

## 6.2 Launching Client

Note: the optional package *umc-addons* must be installed for this test to work.

Launch the sample UniMRCP client application *umc*.

```
cd /opt/unimrcp/bin  
./umc
```

Run a typical speech recognition scenario by issuing the command *run bsr1* from the console of the *umc* client application.

```
run bsr1
```

This command sends a RECOGNIZE request to the server and then starts streaming a sample audio input file *whatstheweatherlike.pcm* to recognize.

Check for the NLSML results to be returned as expected.

```
<?xml version="1.0"?>  
<result>  
  <interpretation grammar="builtin:speech/transcribe" confidence="0.50">  
    <instance>what's the weather like</instance>  
    <input mode="speech">what's the weather like</input>  
  </interpretation>  
</result>
```

Visually inspect the log output for any possible warnings or errors.

Note that utterances are stored in the *var* directory, if the corresponding parameter is enabled in the configuration file *umskaldisr.xml* and/or requested by the client.