ADSP-SC5xxx Setup

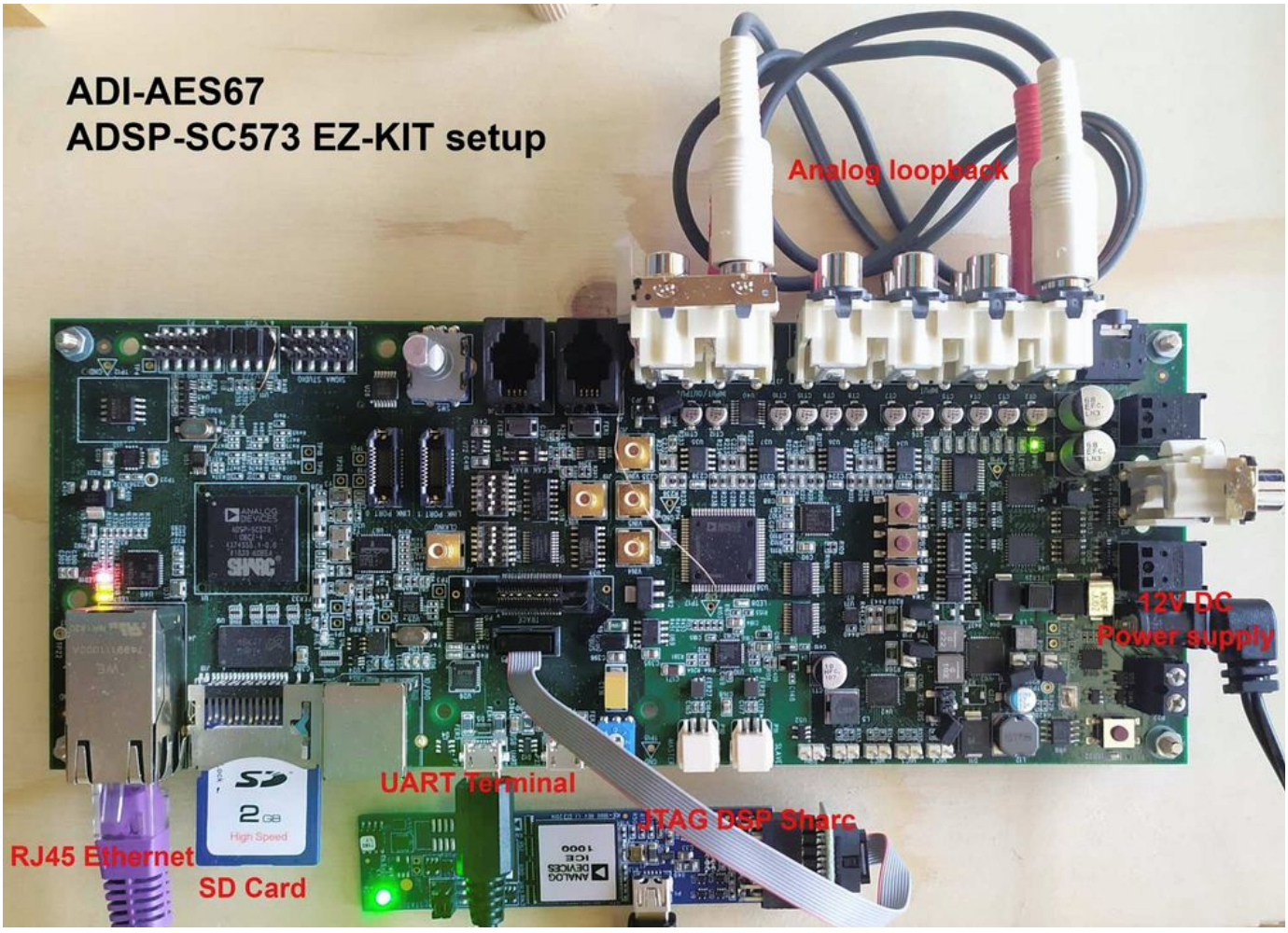
Setup

Demo of the AES67/RAVENNA implementation using the sc573-ezkit

Features

Supported sampling rates are 44.1,48,88.2,96 kHz.
Supported number of channels is 8 in and 8 out at 1 FS and 4 in and 4 out at 2 FS

Board setup



Startup

To run the example :

1. Load the ramdisk/sdcard image using u-boot
2. Log in with username is **root** and the password is **adi**.
3. Modify the /home/root/startup.sh with e.g. nano and set the wanted IP address and hostname (a uniq hostname is required for Avahi).
4. Run startup.sh from /home/root/ directory

Default startup.sh Script

```
hostname adsp-sc573-ezkit-xxx
# NIC setup
ifconfig eth0 169.254.20.13 netmask 255.255.0.0
ethtool -C eth0 tx-frames 1
ethtool -C eth0 tx-usecs 0
ethtool -C eth0 rx-usecs 75
# configuring PTP using ptp4l
/usr/bin/sbin/ptp4l -i eth0 -s &
# increase the irq priority
chrt -r -p 99 9
# AES67
insmod /lib/modules/4.19.0-yocto-standard/extra/MergingRavennaALSA.ko
cd Butler/
./Merging_RAVENNA_Daemon &
# only critical message are print in the console
dmesg -n 1
# SHARC firmware load and start
cd ..
mkdir /lib/firmware
cp -- "Firmware/SharcAES67.ldr" "/lib/firmware/SharcAES67.ldr"
echo "Start SHARC core"
cd /lib/firmware
echo SharcAES67.ldr >/sys/class/remoteproc/remoteproc0/firmware
echo start >/sys/class/remoteproc/remoteproc0/state
```

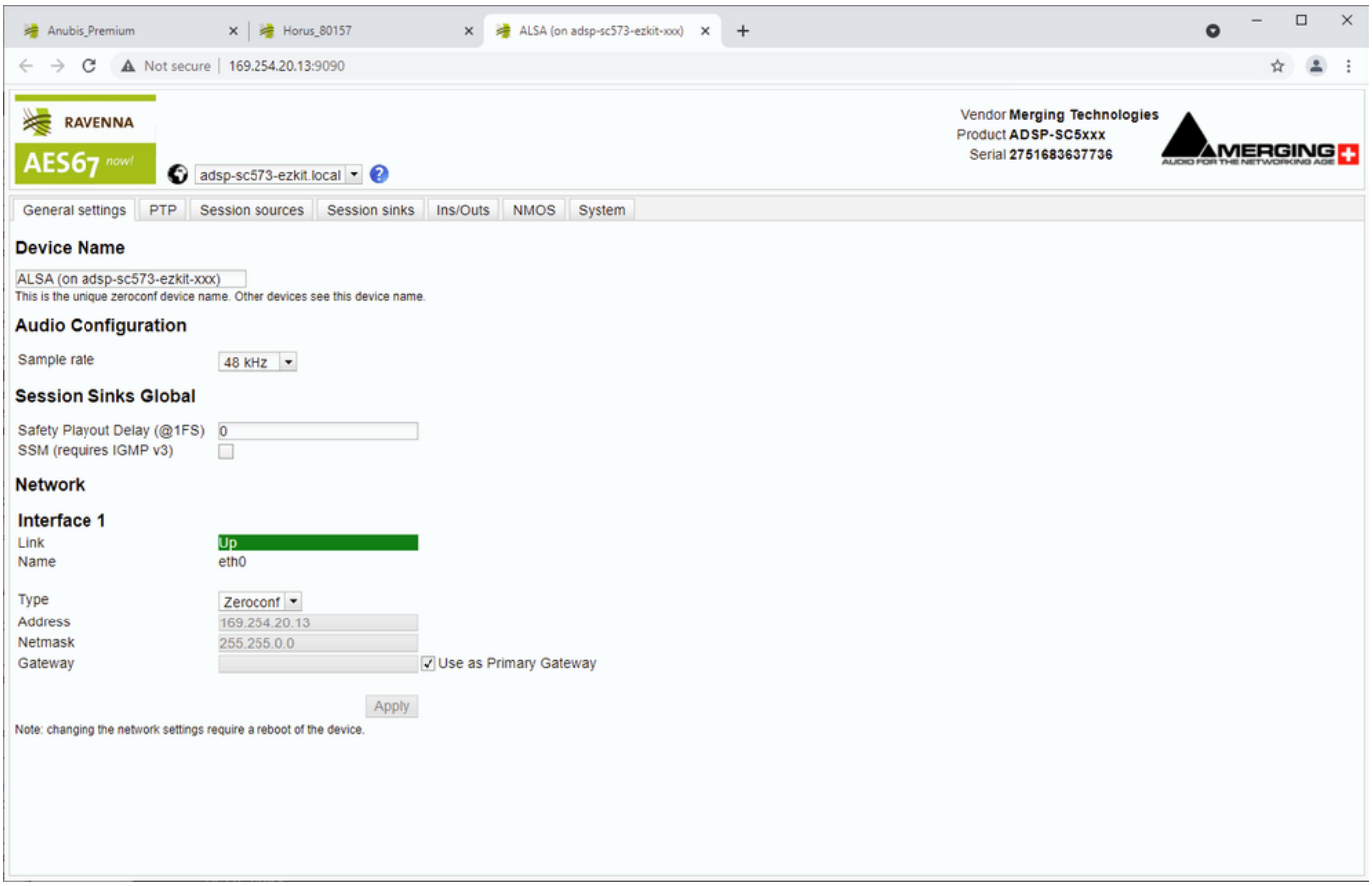
Load a Sharc firmware from Crosscore Embedded Studio :

1. Lines below "# SHARC firmware load and start" need to be commented out
2. Load code on sharc (from Crosscore Embedded Studio)
3. Start sharc code with corecontrol --start 1

Streams Setup

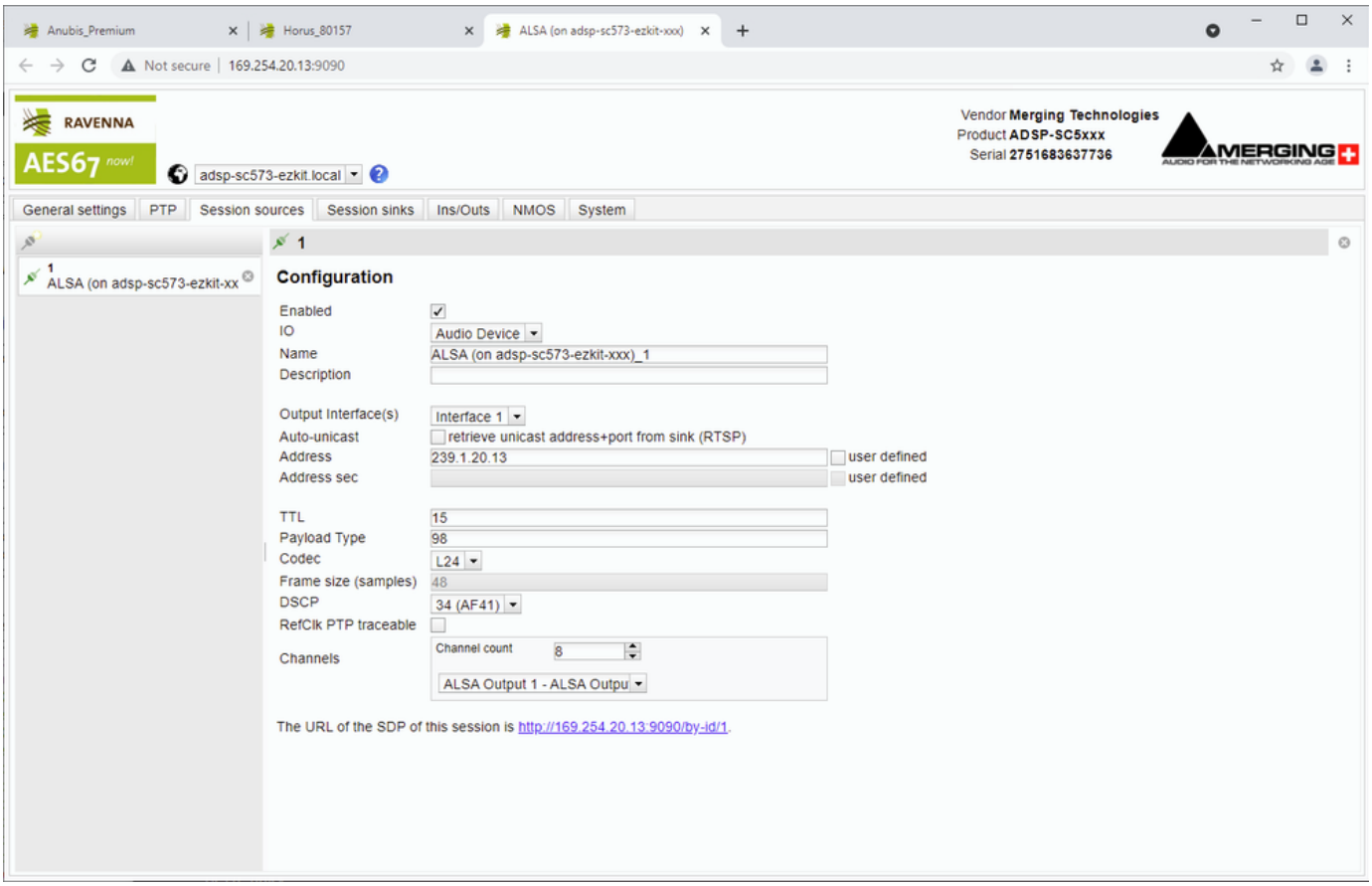
In a browser (Chrome recommended) go to the advanced pages by typing the board IP address followed by :9090 e.g. 169.254.1.5:9090

The following should be shown:

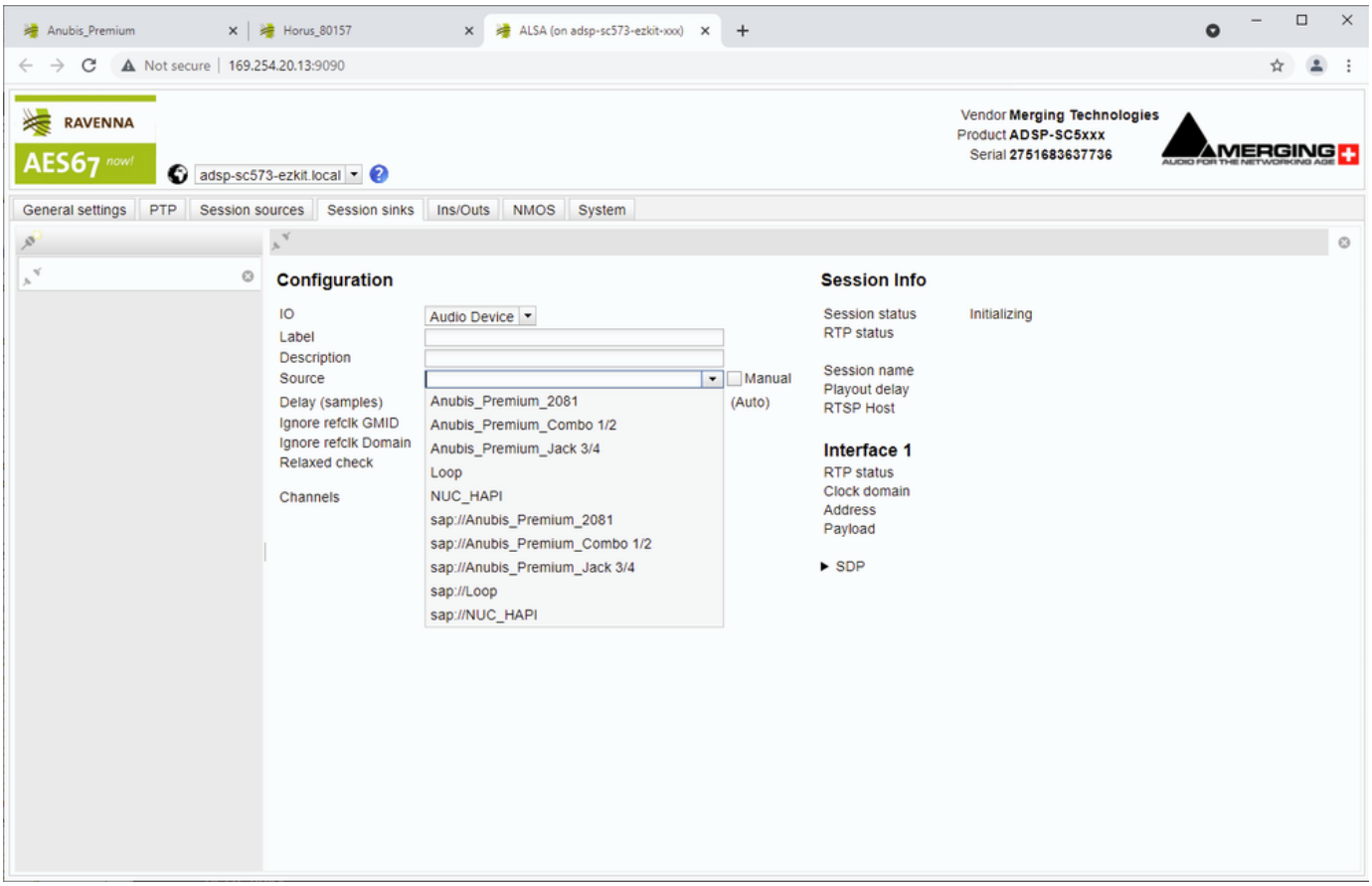


> *For an exhaustive documentation about the user interface, please refer to Merging RAVENNA Advanced Pages User Guide.*

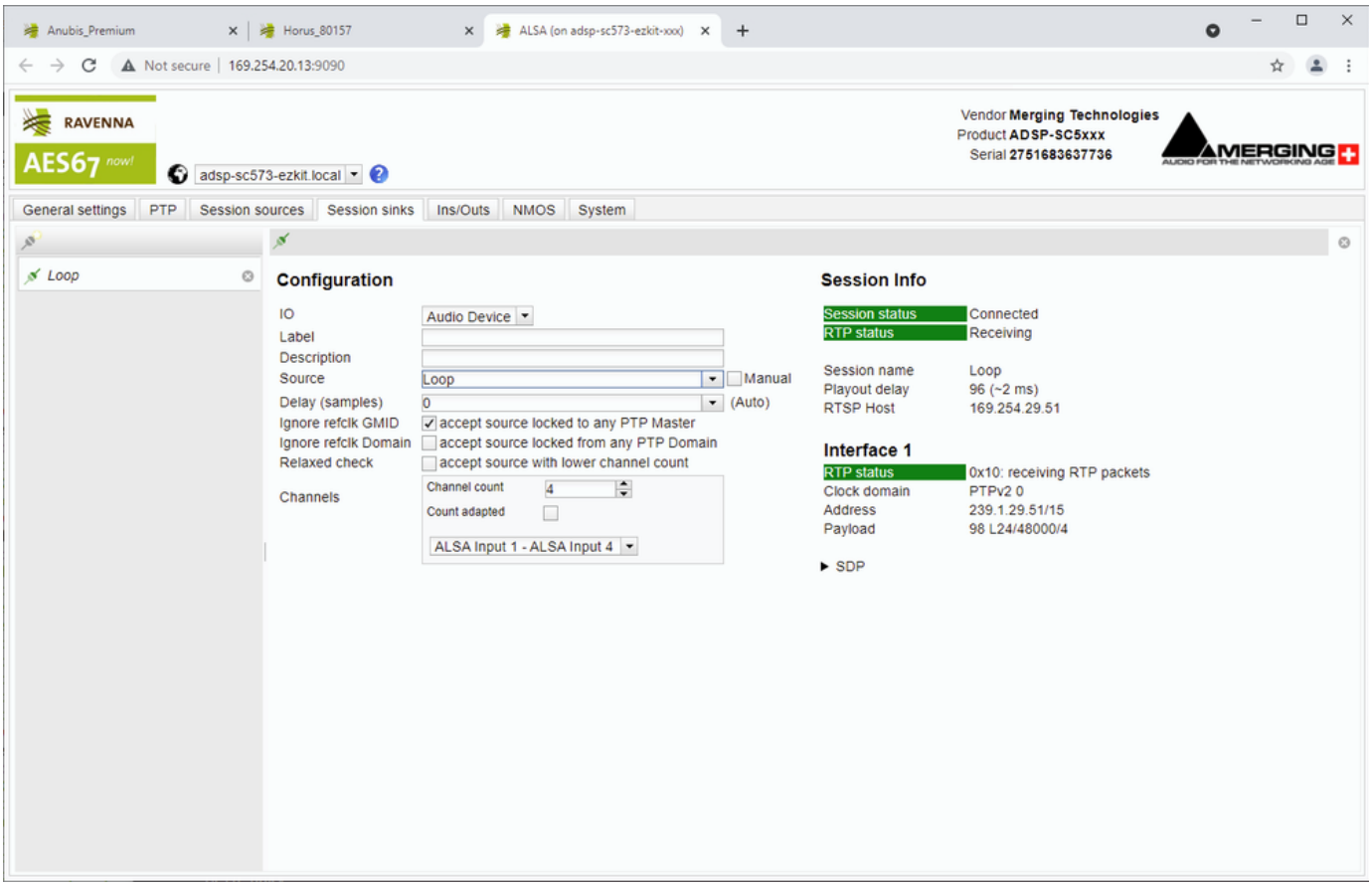
Create a Session source with the button to setup a Transmitter



Create a Session sink with the button to setup a Receiver and select a Source to listen to



A stream will be initialized and its status will reported. If everything is green, the audio is working.



Merging Yocto project build

Prerequisit

If you did not yet setup the developpment environnment, please first refer to the follwing link

https://wiki.analog.com/resources/tools-software/linuxdsp#getting_started

Download and install

1. Download the following package: https://download.merging.com/ADI-AES67/meta-merging-ravenna.tar.gz
2. Extract it to the yocto workspace : workspaces/sources
3. Next to the meta_adi folder you should now see the meta_merging_ravenna folder

Two build targets are possible. In early development step the Ramdisk build target should be preferred.

Ramdisk build target

In a terminal goto to the yocto workspace and start the build process by using the following commands.

> *source setup-environment -m adsp-sc573-ezkit*
>
> *bitbake -c cleanall merging-ravenna-alsa-mod*
> *bitbake -c cleanall adsp-sc5xx-ramdisk*
> *bitbake -c cleanall startup-script*
> *bitbake -c cleanall linuxptp-merging*
> *bitbake -c cleanall firmware*
>
> *bitbake adsp-sc5xx-ramdisk*
>
> *#copy into the TFTP host folder*

```
cp tmp/deploy/images/adsp-sc573-ezkit/zImage /tftpboot
cp tmp/deploy/images/adsp-sc573-ezkit/sc573-ezkit.dtb /tftpboot
cp tmp/deploy/images/adsp-sc573-ezkit/adsp-sc5xx-ramdisk-adsp-sc573-ezkit.cpio.xz.u-boot /tftpboot/ramdisk.cpio.xz.u-boot
```

SDCard build target

In a terminal goto to the yocto workspace and start the build process by using the following commands.

```
source setup-environment -m adsp-sc573-ezkit

bitbake -c cleanall merging-ravenna-alsa-mod
bitbake -c cleanall adsp-sc5xx-ramdisk
bitbake -c cleanall startup-script
bitbake -c cleanall linuxptp-merging

bitbake adsp-sc5xx-minimal

#copy the SDCard required files into the deploy folder

sudo cp ~/workspace/build/tmp/deploy/images/adsp-sc573-ezkit/adsp-sc5xx-minimal-adsp-sc573-ezkit.tar.xz ~/workspace
/deploy
sudo cp ~/workspace/build/tmp/deploy/images/adsp-sc573-ezkit/sc573-ezkit.dtb ~/workspace/deploy
sudo cp ~/workspace/build/tmp/deploy/images/adsp-sc573-ezkit/zImage ~/workspace/deploy
```

Merging receipes overview

Merging Yocto receipes are located in workspace/sources/meta-merging-ravenna/recipes-merging-ravenna

Folder name	Files type	Description	Licence
butler	Binary and web server files	• Communication and configuration of the LKM • High level RAVENNA / AES67 protocol implementation • mDNS / SAP discovery • NMOS IS-04/05 discovery /r egistration/managment • Web server • CometD / HTTP REST API frontend	Merging Proprietary
firmware	LDR Sharc executable	• SharkAES67.ldr : default aka SharcAES67_ADA.ldr • SharcAES67_ADA.ldr : Incoming stream to DA and outcoming stream from AD • SharcAES67_loopback.ldr : L2 cache loopback	Closed
linux	Patch, Cfg	Kernel patches and config	None
linuxptp-merging	C project	ptp4l software is an implementation of the Precision Time Protocol (PTP) according to IEEE standard 1588.	GNU General Public License GPLv2
merging-ravenna-alsa-mod	C project	Linux Kernel Module (LKM) MergingRavennaALSA.ko • RTP audio packets receive / transmit • RTP audio encoding / decoding • PTP interrupt handling and configuration • L2 R/W managmeent	GNU General Public License GPLv3
startup-script	sh scripts	Scripts starting the AES67 environnment • startup.sh : default aka startup_noautostart.sh • startup_noautostart.sh : Need to be run manualy • startup_autostart.sh : Auto start the environnment at startup Check startup-script_autostart.bb.disable in case of startup_autostart.sh use	Closed

Options

Butler configuration options

Next to the Butler (Merging_RAVENNA_Daemon) there is configuration file : merging_ravenna_daemon.conf

The following options can be set :

- interface_name : Network interface name used by RAVENNA/AES67 network. e.g eth0, eth2, enc0, br1...

- device_name : By default the name is "Merging ALSA-AES67 (on <hostname>". This can be changed but the name has to be unique on the network (used by Zeroconf) and white spaces are not supported
- web_app_port : Port number on which the RAVENNA/AES67 webserver will listen to
- web_app_path : Path of the webapp folder provided in the package. Should terminate by webapp/advanced
- tic_frame_size_at_1fs : Frame size in sample at 1Fs (44.1 / 48 kHz). e.g 48 for AES67
- config_pathname : Path where the config file will be saved e.g streamer and receiver
- max_tic_frame_size : In case of a high value of tic_frame_size_at_1fs, this have to be set to 8192
- source_name_prefix : The name of the source that will be automatically used. Useful in the high-end world
- default_sample_rate : Samplerate (44100, 48000, 96000, ...) set at daemon launch. Useful to start at the nominal system samplerate

For the ADI project the following options are set :

```
config_pathname=./ALSA_configuration.cfg
web_app_path=./webapp/advanced
interface_name=eth0
web_app_port=9090
tic_frame_size_at_1fs=48
default_sample_rate=48000
```

SHARC working modes

The SHARC has 3 working modes :

1. Loopback the audio data in the L2
2. Send the audio data from the L2 SRAM to the DAC
3. Send the audio data from the ADC to the L2 SRAM

The working mode is defined at the beginning of the src/main.c file.
Working mode 1) and 3) cannot both be set.

The ADC/DAC implementation only supports 4 channels at the moment.
The sampling rate of the ADC/DAC is defined in inc/common.h "#define ADA_FS 1"

LKM loopback modes

2 loopback mode are possibles :

1. Loop in Sharc : MT_SHARC_LOOPBACK
2. Loop in the LKM : MT_LOOPBACK

Loopack #define option in

workspace/sources/meta-merging-ravenna/recipes-merging-ravenna/merging-ravenna-alsa-mod/files/ravenna-alsa-lkm/common/MergingRAVENNACommon.h

The provided package is set to mode 1 (loopback in SHARC)

Misc

Known issues

- PTP Domain is limited to 0, DSCP not working, Master Slave status not reported, Statistics not working RAV-1537
- Max Sink and Sources size should be limited to 4 @ 96kHz and 88.2 kHz RAV-1527
- When using ADC or DAC one cannot change sampling rate and number of channels during runtime.

Ressources

Sources

Ask by email to Merging

ADI Merging AES67LKM repository

https://bitbucket.org/MergingTechnologies/ravenna-alsa-lkm/src/yocto/

Web user interface documentation

Merging RAVENNA Advanced Pages User Guide.