

ADSP-SC5xxx Setup

Setup

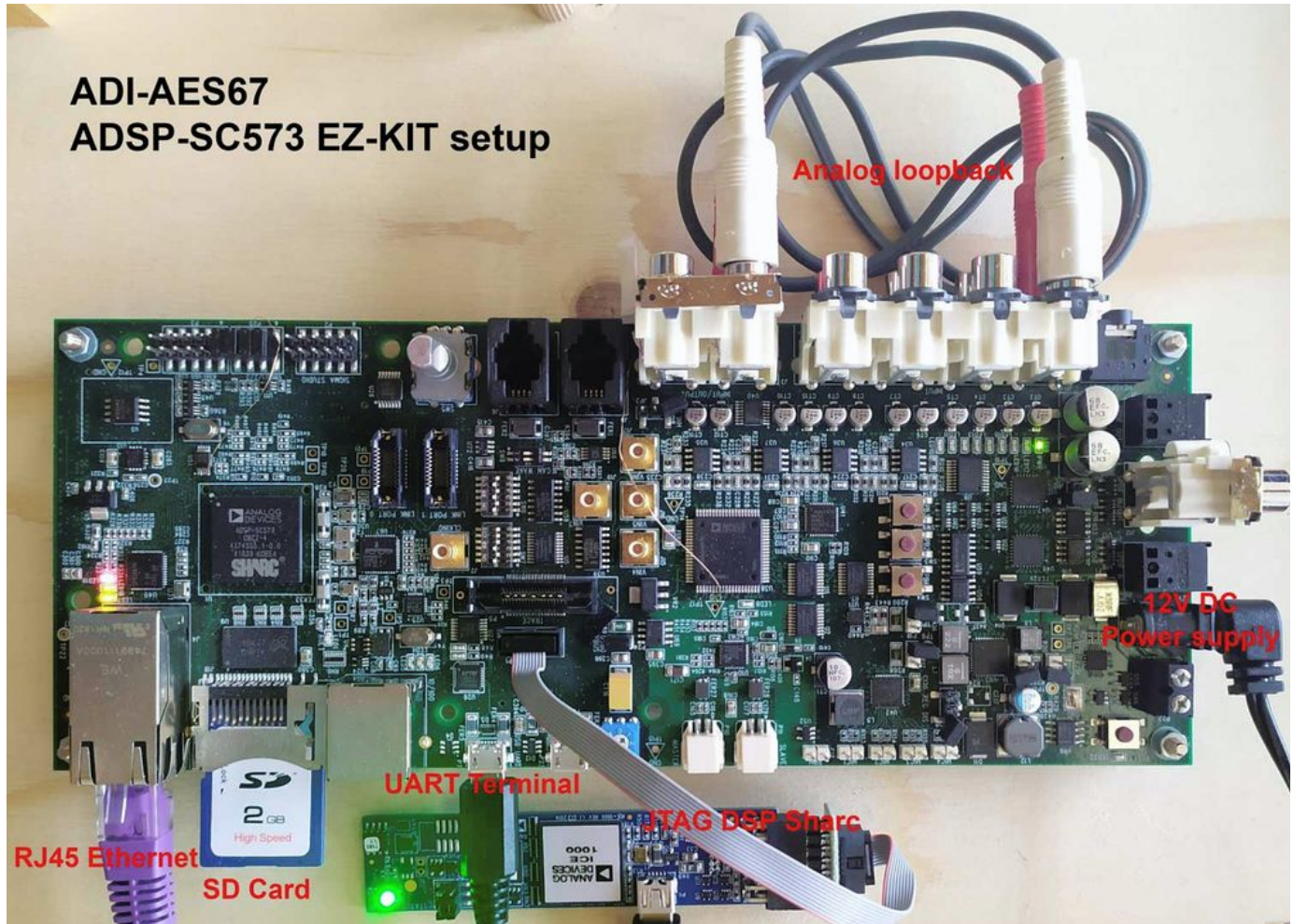
Demo of the AES67/RAVENNA implementation using the sc573-ezkit

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/SharcaAES67.ldr" "/lib/firmware/SharcaAES67.ldr"
echo "Start SHARC core"
cd /lib/firmware
echo SharcaAES67.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:

The screenshot shows the RAVENNA AES67 web interface. The browser address bar displays the URL `169.254.20.13:9090`. The page header includes the RAVENNA logo, the product name AES67, and the device name `adsp-sc573-ezkit.local`. The vendor information is Merging Technologies, Product ADSP-SC5xxx, and Serial 2751683637736. The interface has several tabs: General settings, PTP, Session sources, Session sinks, Ins/Outs, NMOS, and System. The current view is the General settings page, which is divided into sections: Device Name, Audio Configuration, Session Sinks Global, and Network. Under the Network section, Interface 1 is configured with the following details: Link is Up, Name is eth0, Type is Zeroconf, Address is 169.254.20.13, Netmask is 255.255.0.0, and the Use as Primary Gateway checkbox is checked. An Apply button is located at the bottom of the network configuration section. A note at the bottom states: "Note: changing the network settings require a reboot of the device."

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

Anubis_Premium | Horus_80157 | ALSA (on adsp-sc573-ezkit-xxx) | 169.254.20.13:9090

RAVENNA AES67 now!

Vendor Merging Technologies
Product ADSP-SC5xxx
Serial 2751683637736

MERGING AUDIO FOR THE NETWORKING AGE

General settings | PTP | Session sources | Session sinks | Ins/Outs | NMOS | System

Configuration

Enabled

IO Audio Device

Name ALSA (on adsp-sc573-ezkit-xxx)_1

Description

Output Interface(s) Interface 1

Auto-unicast retrieve unicast address+port from sink (RTSP)

Address 239.1.20.13 user defined

Address sec user defined

TTL 15

Payload Type 96

Codec L24

Frame size (samples) 48


DSCP 34 (AF41)

RefCik PTP traceable

Channels Channel count 8

ALSA Output 1 - ALSA Output

The URL of the SDP of this session is <http://169.254.20.13:9090/by-id/1>

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

Browser tabs: Anubis_Premium, Horus_80157, ALSA (on adsp-sc573-ezkit-xxx)

Address bar: Not secure | 169.254.20.13:9090

Vendor: **Merging Technologies**
Product: **ADSP-SC5xxx**
Serial: **2751683637736**

Logo: **MERGING** AUDIO FOR THE NETWORKING AGE

Navigation: General settings | PTP | Session sources | Session sinks | Ins/Outs | NMOS | System

Configuration

IO	Audio Device
Label	
Description	
Source	<input type="checkbox"/> Manual (Auto)
Delay (samples)	Anubis_Premium_2081
Ignore refclk GMID	Anubis_Premium_Combo 1/2
Ignore refclk Domain	Anubis_Premium_Jack 3/4
Relaxed check	Loop
Channels	NUC_HAPI sap://Anubis_Premium_2081 sap://Anubis_Premium_Combo 1/2 sap://Anubis_Premium_Jack 3/4 sap://Loop sap://NUC_HAPI

Session Info

Session status: Initializing

RTP status

Session name

Playback delay

RTSP Host

Interface 1

RTP status

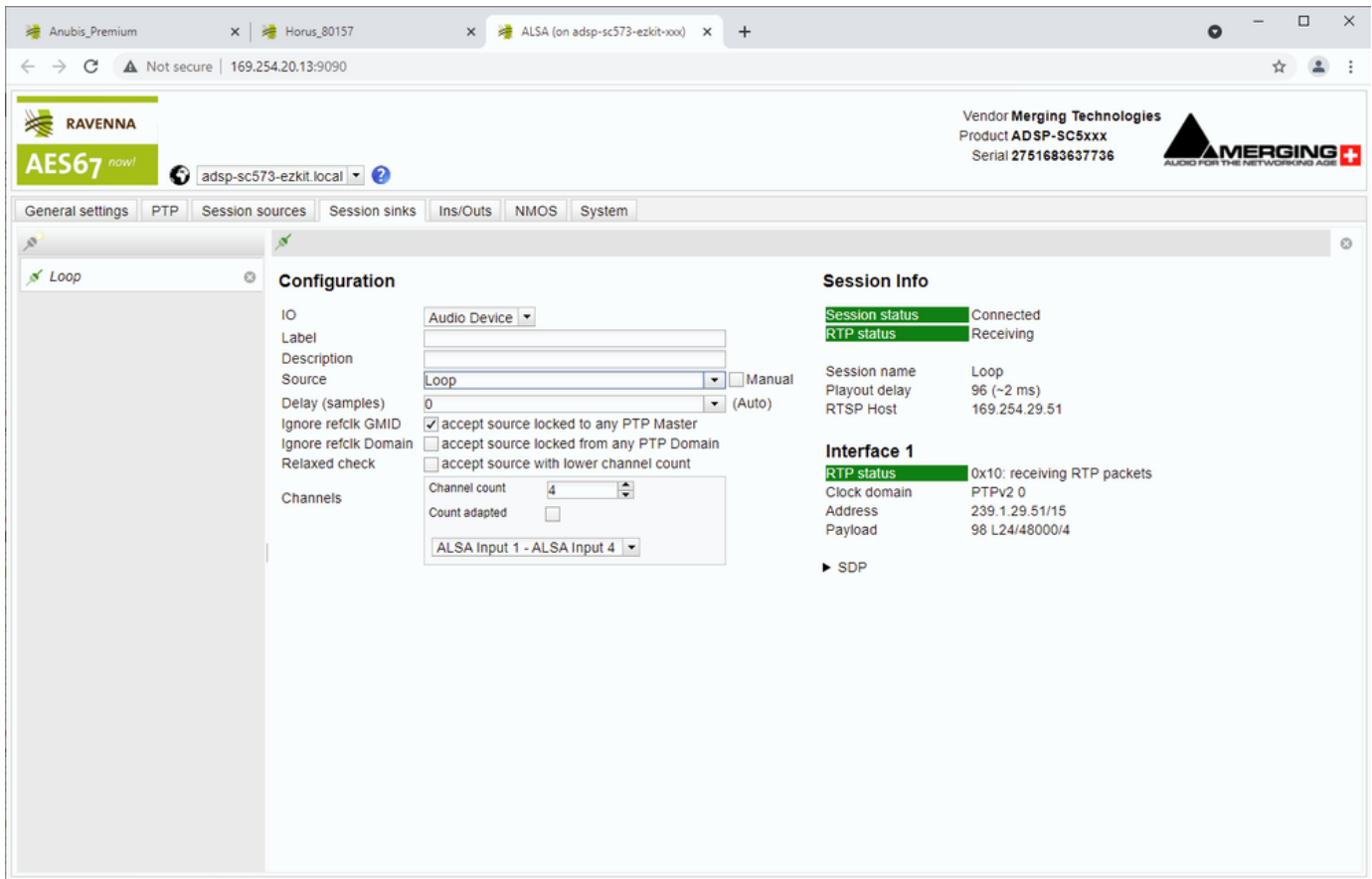
Clock domain

Address

Payload

▶ SDP

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



Merging Yocto project build

Prerequisite

If you did not yet setup the development environment, please first refer to the following 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • RTP audio packets receive / transmit • RTP audio encoding / decoding • PTP interrupt handling and configuration • L2 R/W managment 	GNU General Public License GPLv3
startup-script	sh scripts	Scripts starting the AES67 environment <ul style="list-style-type: none"> • startup.sh : default aka startup_noautostart.sh • startup_noautostart.sh : Need to be run manually • startup_autostart.sh : Auto start the environment 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.](#)