SAI Linux driver

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Stable: 22.10.2019 - 08:02 / Revision: 22.10.2019 - 08:01

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1 Article purpose

This article introduces the SAI LinuxÂ® driver for the SAI internal peripheral.

2 Short Description

The SAI[1] Linux driver is an ASoC CPU DAI driver implemented in the Linux ALSA framework.

3 Configuration

3.1 Kernel Configuration

Activate the SAI[1] Linux driver in the kernel configuration using the Linux Menuconfig tool: Menuconfig or how to configure kernel.

```
[*] Device Drivers
    [*] Sound card support
        [*] Advanced Linux Sound Architecture
            [*] ALSA for SoC audio support
                STMicroelectronics STM32 SOC audio support
                     [*] STM32 SAI interface (Serial Audio Interface) support
```

3.2 Device tree

Refer to the SAI device tree configuration article when configuring the SAI Linux kernel driver.

4 How to use

The SAI Linux driver can be accessed from userland through an ALSA device. Refer to ALSA overview for information on how to list and use ALSA devices.

5 How to trace and debug

The debugfs and procfs file system can be checked to get information on the SAI driver and the resources it uses. A non-exhaustive list of these file system entries is provided below. Refer to ALSA overview for more details on debugging tools.

- debugfs entries:
  - **asoc**: refer to ALSA_overview#How_to_monitor
  - **clk**: refer to Clock_overview#How_to_monitor_with_debugfs to get information on clocks.
  - **pinctrl**: refer to Pinctrl_overview#How_to_monitor to get information on pins.
  - **regmap**: allow to monitor SAI peripheral registers.

```
$ cat /sys/kernel/debug/regmap/xxx.audio-controller/registers
```

- procfs entries:
  - **asound**: refer to ALSA_overview#How_to_debug
  - **interrupts**: allow to check interrupts.

```
$ cat /proc/interrupts
```

6 Source code location

The STM32 SAI peripheral includes two independent audio subblocks that share common resources. The driver source code reflects this architecture.

sound/soc/stm/stm32_sai.c : handles common resources such as clock, interrupt, reset and shared register.

sound/soc/stm/stm32_sai_sub.c : handles the resources dedicated to each subblock.

7 References

- â [1.01.1] SAI internal peripheral

Serial Audio Interface (Mechanism used to transfer non-buffered audio data between processors and/or audio converters.)

ALSA System on Chip

Central processing unit

Digital Audio Interface

Advanced Linux sound architecture

Process File System (See https://en.wikipedia.org/wiki/Procfs for more details)

Debug File System (See https://en.wikipedia.org/wiki/Debugfs for more details)