

SM501 Driver

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The Silicon Motion SM501 multimedia companion chip is a multifunction device which may provide numerous interfaces including USB host controller USB gadget, asynchronous serial ports, audio functions, and a dual display video interface. The device may be connected by PCI or local bus with varying functions enabled.

Core

The core driver in drivers/mfd provides common services for the drivers which manage the specific hardware blocks. These services include locking for common registers, clock control and resource management.

The core registers drivers for both PCI and generic bus based chips via the platform device and driver system.

On detection of a device, the core initialises the chip (which may be specified by the platform data) and then exports the selected peripheral set as platform devices for the specific drivers.

The core re-uses the platform device system as the platform device system provides enough features to support the drivers without the need to create a new bus-type and the associated code to go with it.

Resources

Each peripheral has a view of the device which is implicitly narrowed to the specific set of resources that peripheral requires in order to function correctly.

The centralised memory allocation allows the driver to ensure that the maximum possible resource allocation can be made to the video subsystem as this is by-far the most resource-sensitive of the on-chip functions.

The primary issue with memory allocation is that of moving the video buffers once a display mode is chosen. Indeed when a video mode change occurs the memory footprint of the video subsystem changes.

Since video memory is difficult to move without changing the display (unless sufficient contiguous memory can be provided for the old and new modes simultaneously) the video driver fully utilises the memory area given to it by aligning fb0 to the start of the area and fb1 to the end of it. Any memory left over in the middle is used for the acceleration functions, which are transient and thus their location is less critical as it can be moved.

Configuration

The platform device driver uses a set of platform data to pass configurations through to the core and the subsidiary drivers so that there can be support for more than one system carrying an SM501 built into a single kernel image.

The PCI driver assumes that the PCI card behaves as per the Silicon Motion reference design.

There is an errata (AB-5) affecting the selection of the of the MIXCLK and M1CLK frequencies. These two clocks must be sourced from the same PLL, although they can then be divided down individually. If this is not set, then SM501 may lock and hang the whole system. The driver will refuse to attach if the PLL selection is different.