Platform SoC

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With their high performance CPUs/GPUs and extensibility, our platform SoCs meet the diverse needs of customers

PF SoCs

With their high performance CPUs and GPUs, as well as high-speed interfaces, this product family offers the best products for developing high performance, low power consumption systems at low cost. We have a product lineup that supports the diverse requirements of office, industrial, medical and other equipment that cannot be met by current application processors. In addition, we have an evaluation board and software that enable quick commencement of system development.

- High Performance CPUs
  - Multiple ARM Cortex-A15® CPU cores, which allow them to operate at high speeds. In addition to the Cortex-A15, PF SoCs also have ARM Cortex-A7 CPU cores, which are compatible with the Cortex-A15 as well as the software used and have low power consumption. By using these CPU cores and configuring the big.LITTLE architecture proposed by ARM, PF SoCs meet two conflicting needs—high processing performance and low-power operation—at a high level. These CPU cores can also be used independently as AMP (asymmetric multiprocessing) processors.

- Development Environment for Increasing Efficiency of Development
  - The purpose of our platform software is to increase the cost effectiveness of software development for PF SoC users. In addition to an OS and device drivers, the platform software includes firmware that maximizes the performance of the PF SoCs. What's more, it includes OpenGL ES, OpenCL and other standard libraries supporting OpenAPI, that reduce development periods and enhance asset utilization.

- Advanced GPUs
  - In addition to their high performance CPUs, PF SoCs have ARM Mali-T624 GPUs. Using the advanced Mali-T624 GPU, PF SoCs achieve GPGPU computing that improves the performance of overall parallel computing as well as sophisticated graphics processing.

- Function Enhancement with PCI Express
  - The PF SoC has PCI Express. By connecting user logic and the PF Soc, users can use both the logic that is their unique advantage and a CPUs with high processing performance.

- Function Enhancement with USB
  - As an example of function enhancement with USB, a SATA interface can be enhanced by connecting Socionext's MB86C311/E501 to a PF SoC to enable hard disks (HDD) and other storage devices to be connected to it.

- High Extensibility
  - PF SoCs can also meet requirements related to the enhancement of product functionality through the use of hardware situated outside the SoCs in a product's configuration. The PF SoCs make the development of high-performance systems possible thanks to its high-speed interfaces (including PCI Express) whose generous bandwidth prevent bottlenecks forming in interfaces with custom LSIs outside the SoC.

- Fine Power Domain Control
  - By stopping the power supply to functions of the SoCs that are not in use, system power consumption can be reduced. PF SoCs divide the entire SoC into multiple power domains in order to enable fine power control.

- Reducing Risk in Custom SoC Development
  - There are largely two types of approaches for realizing user-specific functions with LSI and configuring the system: an approach of developing a totally new SoC with user logic (3) and another approach of developing new LSI with user logic only for the difference with the PF SoC and using them as a chipset (2).
MB86S71

ARM General-purpose Processor for Small and Portable Equipment

The MB86S71 is a high-performance general-purpose ARM processor intended for portable equipment, with excellent power consumption performance.

With its dual ARM Cortex-A15 cores that operate at 1.6 GHz and also dual Cortex-A7 cores with high power consumption performance, the SoC has sufficiently high processing performance.

By using these four CPU cores and configuring the big.LITTLE architecture proposed by ARM, the MB86S71 achieves high processing performance and low-power operation. This product uses an ARM Mali-T624 GPU.

In addition to Socionext’s unique enhanced Wake on LAN function, the MB86S72 supports a Wake on USB function. With its ability to finely control the power of unused functional blocks and its memory controller capable of continuing to supply power to external SDRAM even when in a sleep state, the MB86S72 supports low system power consumption from various viewpoints.

MB86S73

ARM General-purpose Processor with Well-balanced Processing Performance and Power Saving

The MB86S73 has two high performance, high power efficient ARM Cortex-A7 CPU cores and can operate at the high speed of 1.6 GHz thanks to its unique and innovative implementation of hardware. Its benchmark, which measures CPU performance, also suggests that the MB86S73 is an extremely power efficient SoC.

The MB86S73 enables power control optimized for all kinds of uses with its subdivided power domain and clock domain. For instance, it supports the retention mode, in which the power of the MB86S73 is shut down when the memory devices are set to self-refresh mode. This feature allows the MB86S73 to stand by with low power consumption that is well below 1mW, contributing to the reduction in system power consumption and resumption time. It also supports DIMM, which makes it easy to select appropriate memory devices for the system.

The MB86S73 uses a Mali-T624 GPU. With this advanced GPU, which supports OpenGL ES 3.0, it is possible to realize a highly versatile software platform. The MB86S73 features Socionext’s unique standby and response function. In addition to Wake on LAN for devices on a network, automatic response, and Wake on USB functions are also supported. By realizing a part of network processing in hardware, these functions enable a reduction in the CPU load, allowing other tasks to be allocated to the CPU even when network communication is in process.

MB86S72

ARM General-purpose Processor Suitable for Developing Systems with High Performance and Low Power Consumption

The MB86S72 was developed as a high-end model of the MB86S73. The SoC has two ARM Cortex-A15 cores and two ARM Cortex-A7 cores. By using these four CPU cores and configuring the big.LITTLE architecture proposed by ARM, the MB86S72 achieves high processing performance and low-power operation. This product uses an ARM Mali-T624 GPU.

In addition to Socionext’s unique enhanced Wake on LAN function, the MB86S72 supports a Wake on USB function. With its ability to finely control the power of unused functional blocks and its memory controller capable of continuing to supply power to external SDRAM even when in a sleep state, the MB86S72 supports low system power consumption from various viewpoints.

Platform SoC
### Product Specifications

<table>
<thead>
<tr>
<th>Package</th>
<th>Function</th>
<th>MB86S71</th>
<th>MB86S72</th>
<th>MB86S73</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU core</td>
<td>Cortex™-A15 2core Up to 1.6GHz 1MB-L2C</td>
<td>Cortex™-A15 2core Up to 1.6GHz 1MB-L2C</td>
<td>—</td>
<td>—</td>
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<tr>
<td>3D/GPGPU</td>
<td>Mail™-T624 1core 400MHz 32kB-L2C</td>
<td>Mail™-T624 1core 400MHz 32kB-L2C</td>
<td>Mail™-T624 1core 400MHz 32kB-L2C</td>
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<tr>
<td>MEMC</td>
<td>DDR3 1.6GHz, DDR3L 1.333GHz, LPDDR3 1.333GHz, 64bit/32bit</td>
<td>DDR3 1.6GHz, DDR3L 1.333GHz, 64bit/32bit</td>
<td>DDR3 1.333GHz, DDR3L 1.066GHz, 64bit/32bit</td>
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<td>SCB CPU</td>
<td>125MHz</td>
<td>125MHz</td>
<td>125MHz</td>
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<tr>
<td>LAN</td>
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<td>GB/E, WOL, TCP Acceleration</td>
<td>GB/E, WOL, TCP Acceleration</td>
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<tr>
<td>FLASH-IF</td>
<td>HSSP, NOR, eMMC, NAND HSSP/NOR</td>
<td>HSSP, NOR, eMMC, NAND HSSP/NOR</td>
<td>HSSP, NOR, eMMC, NAND HSSP/NOR</td>
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<tr>
<td>SERIAL-IF</td>
<td>UART 3ch, GPIO 16ch, 1’c 3ch</td>
<td>UART 3ch, GPIO 16ch, 1’c 3ch</td>
<td>UART 3ch, GPIO 16ch, 1’c 4ch</td>
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<tr>
<td>CODEC</td>
<td>4k-compatible multi-stream video, 32x x 32x JPEG CODEC</td>
<td>32x x 32x JPEG CODEC</td>
<td>32x x 32x JPEG CODEC</td>
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<td>Display</td>
<td>HDMI / MIPI DSI</td>
<td>FPD Link (4lane)</td>
<td>FPD Link (4lane)</td>
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<td>AUDIO</td>
<td>2ch I’S</td>
<td>2ch I’S</td>
<td>2ch I’S</td>
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<td>SD</td>
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<td>1ch SDIO</td>
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<tr>
<td>PCIe</td>
<td>1ch PCIe-Gen2-4lane + Data Scrambler</td>
<td>2ch PCIe-Gen2-4lane + Data Scrambler</td>
<td>2ch PCIe-Gen3-4lane + Data Scrambler</td>
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<tr>
<td>USB 3.0</td>
<td>1ch Host</td>
<td>2ch Host</td>
<td>2ch Host</td>
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</tr>
<tr>
<td>USB 2.0</td>
<td>1ch Device</td>
<td>1ch Host/Device</td>
<td>1ch Host/Device</td>
<td></td>
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</tbody>
</table>

### Development Environment

A development evaluation board is provided for each PF SoC product. Since a Linux BSP is provided for each PF SoC product, customers can commence their development and evaluation immediately.

We provide a semicustom board that can be used to evaluate custom LSIs using user logic by connecting it with an evaluation board for PF SoCs. Approximately 15 million gates of user logic can be written on the FPGA installed on the semicustom board.

Pieces of software related to specific functions, including the processing function related to system control, the security function, and the network standby and response function, are consolidated into the System Controller Firmware (SCFW). Applications control the SoC through this firmware.

PF SoC users can reduce the burden of developing relevant functions by using this firmware which functions together with Linux and shift their resources to application development.

For example, to transition SoC mode to the power saving mode, applications use a general Linux framework. In a lower layer, however, Linux and SCFW operate in close cooperation. This enables state transition without requiring application developers, in particular, to be aware of the SoC power supply or clock control functions.

SCFW also assumes control of resumption from power saving mode. Linux and SCFW share the role of controlling SoC, which enables more robust systems and flexible extension and customization of hardware.

This mitigates the impact on the kernel or BSP when a new custom SoC is developed and makes it possible to quickly obtain the PF SoC and other software that operate the SoC.

In the future we will increase the availability of middleware and expand the scope of support for embedded OSs and other software while aggressively promoting the use of open source software and collaboration with our partners.

In addition, as a method for simplifying the power control of an entire system, we at Socionext will provide a unique solution that will seamlessly manage the power of custom LSIs as well as PF SoCs from an application on Linux.

### Platform Software

Solving challenges in system development, such as an increasing scale and performance improvement, requires enhanced software. For this reason, Socionext provides “platform software” (PF SW).

This software increases the efficiency of software development by maximizing the performance of PF SoC, enhancing the reusability and performance portability of current software assets, and simplifying the introduction of third-party software.

PF SW belongs to the software layer that serves the basic functionality, of all other software layers in embedded devices, and supports the use of the standard Open Framework, including OpenGL and OpenCL, in addition to other software, including the drivers and firmware that control PF SoC and Linux Kernel.

Since common PF SW is provided for all PF SoCs, the compatibility of higher level applications is increased and reusability of current software is enhanced, which is effective in reducing development risks such as the development period and development costs. The same benefits can be also enjoyed with custom SoCs developed based on PF SoC.