



# Blackfin Solutions for RealVideo in Personal Media Players

## The Developing Media Player Market

The portable media player market continues to grow on a worldwide basis, forecasted to achieve shipments of 119M units in 2008 (iSuppli, 2007). Chinese manufacturers account for a large number of the shipments. The early entries in this product class were based on small 1.8" displays, which didn't offer much in terms of usability or quality of display. As this product category develops, the display size is growing to provide a screen size approaching 4 inches.

This increased viewing area requires more robust technology to decode the media. Higher resolution video requires more compute cycles to decode, assuming that the codec and compression remain constant. If the media is highly compressed to use less storage, this may require more processing power to extract the image stream. Encoding formats control the three most important factors determining playback quality: fidelity to the original content, compression ratio of display data to the transmitted or stored data, and decoder processing performance. Codecs are thus a key component of the advanced PMP design.

## Codecs for Leading Edge PMP Devices

Video content for PMP playback is available in a number of different formats. A successful player must support multiple formats to satisfy consumer demand for a "universal" playback capability. Some of these formats may be of interest for playing "legacy" content and others are needed for playing the latest television series episode or sporting event. At this end of the codec spectrum, there is constant change as new standards and distribution channels come into play. There is also a regional dependence on the preferred media format. What is popular with European consumers may be different from what is popular or available in the American

or Asian markets, especially as portable players approach broadcast television standard resolution.

One of the dominant players in the media codec technology business is RealNetworks®. RealNetworks has been a leading innovator in media players for the personal computer and, along with Microsoft® Windows Media® Player and Apple® QuickTime® Player, dominates the personal computer market. However, RealNetworks is not tied to a particular hardware platform or operating system and has moved into the portable player market with great success. Its RealVideo® format is an advanced format that allows either constant bit rate (.rm) or variable bit rate (.rmvb) compression for optimal playback quality.

## Digital Rights Management

Another concern for PMP vendors is digital rights management. Requirements for building DRM-compliant PMPs and similar devices are also becoming more rigorous across the industry as content owners drive for broader protection. As a result, developers will have to implement stronger measures in areas including secure authentication, which ensures that only authorized users have access to protected digital media or personal data. Integrated hardware-based security—not common today—will be necessary to protect private keys and process key exchanges securely, in order to protect data transfer during downloads and uploads. No single DRM scheme prevails everywhere, nor are these schemes currently compatible with each other.

DRM is a necessary headache for consumer devices. The ability to implement the newest standards is a key product consideration. Nobody's interest is served by turning a vendor's inventory or a consumer's purchase into a "brick" due to DRM incompatibility.





## Compute Engines in Media Player Market

Because of the rapid change at the leading edge of the PMP space, it is imperative that successful vendors get to market quickly in order to build market share before competitive pressures and commoditization of feature sets erode the selling price. This calls for a design approach that builds on a flexible hardware platform that can be rapidly customized with the newest features and brought to market. Some PMP vendors have chosen to use two processors to handle the control processing that drives the human interface and peripheral functions and a signal processor to handle the real-time media stream decoding. Others have opted for a processor to handle the control logic and an ASIC to handle the media. A third approach is to use an SoC approach with an on-board processor and a HW codec or DSP combination. All of these approaches trade off BOM cost, power, design flexibility, and time to market. The approach we would like to concentrate on for the remainder of this article is the converged processor market, where a single processor core executes both the control and media processing tasks. This is the domain of the Blackfin® processor. Blackfin processors are designed with an instruction set that facilitates both control and signal processing functions and hardware resources that deliver high performance with power saving voltage and clocking options and “sleep” modes.

The Blackfin family offers a range of performance levels and addresses the need for a variety of peripheral devices and I/O options. The Blackfin family offers a roadmap for device designers to follow as market conditions dictate changing feature sets.

The table below illustrates the strengths of the PMP design approaches we have described. Dedicated, fixed-function hardware obviously has a negative impact on NRE, time to market, and flexibility. Multiple chips (whether MCU plus ASIC, or MCU plus DSP) will lead to higher BoMs and higher system power.

	MCU and DSP	MCU and ASIC	SoC	Blackfin
Time to Market	Very good	Poor	Worst	Very good
Flexibility	Very good	Poor	Poor	Very good
BoM Cost	Poor	Good	Very good	Very good
Power	Poor	Good	Best	Very good
NRE	Low	High	Highest	Low

System on a chip results in a very competitive BoM cost if done well (and a very high NRE if the SoC is custom rather than an ASSP), but a powerful, programmable single core embedded-processor-based platform wins the overall competition. The flexibility of this approach also enables a range of products for multiple standards and regions built on a common hardware platform. NRE is also negligible.

From the table, it is clear that the platform selections that lead to the highest levels of flexibility and best time to market are those in Columns 1 and 4, the fully programmable solutions. This makes sense. Software modules for many functions are available and development cycles can be rapid and numerous. The fixed-function logic approaches (Columns 2 and 3) will probably lead to a respectable BoM in the long term but at the expense of missing the opportunity to develop market share and reap profits from the early adopters and early mainstream customers. They also incur the risk that the market will have shifted in terms of functions, formats, or DRM by the time they come to market.

Many of the leading PMP OEMs in the Chinese market have turned to Blackfin processors from Analog Devices. The Chinese market has developed the infrastructure to support these designs, even in situations where a manufacturer may not retain a strong design engineering function.

Design companies such as IPED (Hangzhou, China) have developed to support Chinese consumer electronics manufacturers with specialized expertise in portable entertainment and navigation markets, such as media players. IPED works with a number of PMP manufacturers that leverage its research and development efforts to quickly bring leading edge portable consumer devices to market.

## Complete Blackfin Solutions for PMP Market Leaders

Analog Devices and its partners have put together a seamless solution that has PMP developers covered in their efforts to stay abreast of the mobile entertainment market. The Blackfin platform will continue to deliver the flexibility and rapid design cycles that are the keys to early profitability in this challenging arena. Analog Devices development tools, software modules, and expert third-party design partners ensure first time success and rapid productization.

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