

# Product Report on Portable Media Player (PMP)

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Intel pioneered a new type of small mobile device targeted for the entertainment use. The device is known as the *Portable Media Player* (PMP) (see Figure 1). The Portable Media Player is a small hand-held device, which is capable of displaying digital pictures, as well as playing digital videos and music. The key feature of PMP is a hardware support for these demanding tasks.



Figure 1. Portable Media Player

The Intel's processor PXA255 from a family of XScale processors will empower the first Portable Media Players. It will provide the clock speed of up to 400MHz [1]. Intel XScale technology offers the low-power consumption to help extend the battery life of these handheld devices by up to an estimated

4 to 6 hours. The Intel XScale microarchitecture RISC core can be integrated with peripherals such as an LCD controller, multi-media controllers and an external memory interface, which enables developing smaller, more cost-effective handheld devices with long battery life and with the performance to run rich multimedia applications [2]. The main features of this architecture that are responsible for the low power consumption and high multimedia processing power are [2]:

- 7-8 stage Intel's superpipelined RISC technology for high speed and ultra low power
- Power management unit that saves power via idle, sleep and quick wake-up modes
- Dynamic voltage and frequency on-the-fly scaling, which allows applications to utilize the right amount of performance and power
- Intel's media processing technology based on coprocessor that performs two simultaneous 16-bit SIMD multiplies with 40-bit accumulation for efficient media processing

The PMP devices have 64MB of SDRAM memory running at 100MHz [1]. In addition, the Portable Media Players have a USB 2.0 interface to communicate with other devices and transfer the digital media, a color LCD panel with touch screen input interface, hard disk drive, quality audio system, 13 input keys, and usual media related outputs that include NTSC and PAL video outputs, as well as the speakers and headphones audio outputs [1]. The battery is a single module consisting of 2 serially connected Panasonic Lithium Ion batteries that provide 7.2 V at 2.0 Ah [1].

To achieve the best possible performance of its XScale processor, the PMP relies on the powerful software technologies. This includes high-performance video software (H.264 and MPEG-4 Part 10 video codec), a USB 2.0 implementation, and powerful hard-drive caching algorithms that extend battery life. A PMP with a 20GB hard drive is estimated to provide up to 70 hours of video storage, play 700 hours of music and hold up to 2 million photos. However, actual device capabilities will vary.

The implemented video coding algorithms are ideal choice for the low-powered wireless devices, since both H.264 and MPEG-4 video codecs support such devices. The MPEG-4 Part 10 and H.264 implements the Advanced Video Coding (AVC) techniques such as scalable video, object-based video coding, enhanced motion estimation and advanced motion prediction, adaptive DC/AC prediction, enhanced error resilience and different levels and profiles support. These Advanced Video Coding techniques not only improve the quality/compression ratio (in comparison to the older codecs like MPEG-2), but also they allow appropriate decoding methods suitable for a small device such as PMPs. The videos that are played with Portable Media Players are stored on a local hard disk and fed to the decoder. The encoder was previously capable of selecting the appropriate profile (a profile for small hand-held device).

A desired feature of such devices would be the wireless interface, however this is not integrated in the pioneering configurations. The reason for this is likely the property of the current wireless technologies. The higher bandwidth wireless communication protocols, such as Bluetooth, have high power consumption [3]. On the other hand, the low-power wireless technologies, such as 802.15.4, have too low bandwidth with the range of only about 1-2 meters [4]. However, the Bluetooth [3] technology could be used on the expense of higher power consumption, if it is assumed that the media transfer occurs significantly less frequently than the media playback.

The future models could include some alternate power sources to improve the power performance. The likely candidate for the alternate power source is solar energy.



Figure 2. Solar alternate power for PMP

The Portable Media Player is used for entertainment purposes, and thus it is likely to be used when traveling (in the train, in the airplane, etc.). In these situations the solar energy is preferred over the fuel cells (the other alternate power initiative) since the fuel cells are flammable. The solar alternate power converts sunlight into current to trickle charge or recharge regular battery.

These stand-alone chargers require significant surface area [5]. In addition they require direct sunlight or artificial light, and constrain device orientation, placement, and wearability [5]. However this might not be a major obstruction in the case of a PMP that is used while traveling (see Figure 2).

## REFERENCES:

- [1] Intel PXA255 Processor based Portable Media Player Reference Design Specification, at [http://www.intel.com/design/pca/otherdevices/downloads/PXA255\\_PMP\\_RDspec.pdf](http://www.intel.com/design/pca/otherdevices/downloads/PXA255_PMP_RDspec.pdf)
- [2] Intel XScale Microarchitecture, at <http://www.intel.com/design/intelxscale/XScaleDatasheet4.pdf>
- [3] Specification of the Bluetooth Core System, at [https://www.bluetooth.org/foundry/specification/document/Bluetooth\\_Core\\_10\\_B/en/1/Bluetooth\\_Core\\_10\\_B.pdf](https://www.bluetooth.org/foundry/specification/document/Bluetooth_Core_10_B/en/1/Bluetooth_Core_10_B.pdf)
- [4] IEEE 802.15.4 Overview, at [http://grouper.ieee.org/groups/802/15/pub/2001/Nov01/01509r0P802-15\\_TG4-Overview.ppt](http://grouper.ieee.org/groups/802/15/pub/2001/Nov01/01509r0P802-15_TG4-Overview.ppt)
- [5] Solar power for Palms showcased in Germany, at <http://zdnet.com.com/2100-11-529341.html>