

# Renesas Releases Middleware for MPEG-4 and H.264 Compatible Hardware Accelerator

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*Capable of 720 x 480 pixel size encoding/decoding at 30 fps, facilitating development of high-image-quality moving image recording/playback applications*

Renesas Technology Corp. today announced the development of middleware for the company's VPU4 (Video Processing Unit 4) image processing hardware accelerator supporting international moving image coding standards such as MPEG-4(\*1) and H.264/MPEG-4 AVC(\*2). This middleware will be available from September 6, 2005 in Japan.

This middleware comprises a software library for use with products incorporating an SH-Mobile(\*3) mobile phone application processor with a VPU4, and enables implementation of high-image-quality, high-performance multimedia applications such as video phone and terrestrial digital broadcasting for mobile phones in Japan (referred to below as "one-segment broadcasting").

This middleware offers the following features.

(1) High-speed MPEG-4 and H.264 encoding/decoding processing capability

This middleware supports the MPEG-4 Simple Profile and H.264 Baseline Profile moving image compression standards. It is optimized to make maximum use of the processing capability of the VPU4, and implements 30 fps (frame per second) 720 x 480 pixel size encoding/decoding performance for both MPEG-4 and H.264. This

makes possible high-quality moving image recording and smooth moving image playback.

(2) High image quality provided by Renesas Technology original image quality control algorithm

The new middleware uses an original image quality control algorithm developed by Renesas Technology. This algorithm uses interframe information to determine the optimum parameters for frames to be encoded. Use of this algorithm enables a 1 dB (decibel) PSNR (Peak Signal to Noise Ratio) improvement to be achieved, resulting in lower noise (such as block distortion) and stable image quality for scenes featuring fast motion. Use of this middleware will enable users to implement video applications such as high-image-quality recording and playback conforming to MPEG-4 and H.264.

(3) Same API for MPEG-4 and H.264, enabling application development time to be shortened

MPEG-4 and H.264 operation of the VPU4 can be implemented with the same type of API (Application Programming Interface). It is only necessary to specify MPEG-4 or H.264 operation when writing the API in an application program, enabling program commonality to be achieved for different applications such as MPEG-4 video phone and H.264 one-segment broadcasting.

This enables application development time to be shortened by approximately two-thirds (Renesas Technology figure) compared with a case where APIs are incorporated separately for MPEG-4 and H.264.

## **Product Background**

Recent advances in multimedia capability in the mobile phone market have brought about a rapid increase in services and applications handling moving images. However, resources such as system memory capacity and communication speed are limited, and it is essential for data to be

encoded to reduce its size. Although MPEG-4 has been increasingly used as a moving image encoding format, the recently introduced H.264 standard offers better encoding efficiency than MPEG-4, and has been decided on for one-segment broadcasting in Japan and DMB(\*4) services in South Korea as well as being proposed for use in European DVB-H(\*5) services.

To simplify multimedia application development for mobile phone systems, Renesas Technology developed the SH-Mobile processor specifically for application processing. Renesas Technology also developed a hardware accelerator compatible with MPEG-4 and other standards, as well as hardware accelerator middleware, to support moving image processing, which have helped in creating multimedia applications and improving development efficiency. In addition, Renesas Technology developed its latest VPU4 as a hardware accelerator supporting not only MPEG-4 but also H.264, and installed it in devices such as the SH-Mobile3A.

Now, Renesas Technology has developed VPU4 middleware, enabling users to achieve improved development efficiency and high-image-quality moving image displays, as a software development solution for video applications using MPEG-4 and H.264, which are expected to become increasingly widely used in the future.

## **Additional Product Details**

This middleware comprises a software library for the VPU4 image processing hardware accelerator. The processing load is shared between hardware and software so as to give an optimal balance of cost and performance, enabling high-image-quality, high-performance video applications to be implemented.

The function specifications include the following three main points.

(1) MPEG-4 Simple Profile support

High processing performance enabling 720 x 480-pixel image encoding/decoding at 30 fps makes it possible to implement high-quality MPEG-4 recording/playback applications.

(2) H.264 Baseline Profile compatible decoder

This middleware facilitates the development of video applications compatible with one-segment broadcasting in Japan, South Korean T-DMB/S-DMB, and European DVB-H. In addition, H.264 application development software solutions can be provided by combining this middleware with Renesas Technology audio middleware or the like.

(3) H.264 real-time high-image-quality encoding

Mobile terminal devices require encoding to be performed in real time, such as when recording moving images shot by a built-in camera. While H.264 can provide higher-quality images than MPEG-4 at the same bit rate, it involves a heavier encoding processing load than MPEG-4, and compatibility between high image quality and high-speed real-time encoding processing is a major concern.

This middleware provides high image quality by applying an original image quality control algorithm to the image quality control function included in the VPU4. Optimization to make maximum use of the processing capability of the VPU4 provides processing performance capable of encoding 30 fps at 720 × 480-pixel images. This encoding function and performance contribute to the implementation of high-image-quality applications such as H.264 video mail and video phone for mobile phones.

The API is the same for MPEG-4 and H.264. It is only necessary to specify MPEG-4 or H.264 operation when writing the API in an application program, enabling programming efficiency to be improved. This enables programs to be shared by different applications, such as

video phone and moving image playback/recording using MPEG-4, and one-segment broadcasting and moving image recording/playback using H.264.

One-segment broadcast reception requires the decoding of various parameters stipulated by ARIB(\*6). As well as parameters for image playback, these include complex parameters important as playback indicators, such as stipulations of playback time, buffer control, and valid playback range. This middleware also handles the decoding of these parameters, allowing the user to concentrate on higher-level application development without having to consider parameter decoding.

Renesas Technology will continue to develop middleware that will contribute to improving the efficiency of multimedia application development in the mobile video field, including mobile phones and digital cameras, and to provide solutions that meet users' needs.

## **Notes:**

1. MPEG-4 is a low-bit-rate moving image coding standard drawn up by ISO/IEC.
2. H.264/MPEG-4 AVC is a moving image coding standard drawn up jointly by ITU-T and ISO/IEC, comprising a next-generation coding standard whose use has been decided on for Japanese terrestrial digital broadcasting and overseas digital broadcasting.
3. SH-Mobile (SuperH Mobile Application Processor) : An original Renesas Technology processor for mobile phone systems that is connected to a baseband LSI and performs dedicated processing of audio, moving image, and similar multimedia applications
4. DMB, T-DMB, S-DMB : Terrestrial digital broadcasting standards. T-

DMB (Terrestrial-digital media broadcasting) and S-DMB (Satellite-digital media broadcasting) are used in South Korea or Europe.

5. DVB-H : A terrestrial digital broadcasting specification for mobile phones drawn up by the DVB (Digital Video Broadcasting Project), a digital broadcasting standardization body in Europe.

6. ARIB (Association of Radio Industries and Businesses) : An organization that receives specifications from the Minister of General Affairs as the “Center for Promotion of Effective Radio Utilization” stipulated by the radio law.

## **Typical Applications**

Mobile phone systems using an SH-Mobile incorporating a VPU4 hardware accelerator.

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