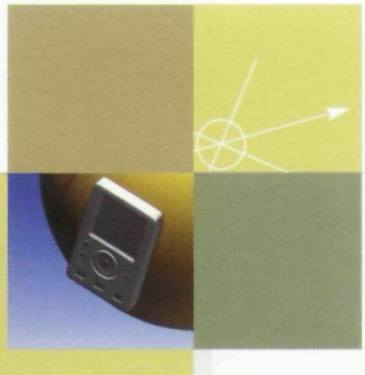

China's compression choice

ALTHOUGH IT'S NOT YET AN OFFICIAL STANDARD, CHINA'S AVS CODEC IS GATHERING SUPPORT—INCLUDING SILICON—AS AN ALTERNATIVE TO H.264 IN CONSUMER DESIGNS.

By John Mu, Executive Editor, EDN China

In the competition between next-generation audio/video compression standards, the popularity of H.264 is on the rise. But H.264 may not be the best fit for all markets or applications. For instance, the Advanced Audio Video Coding Standard in Information Technology (AVS) codec being developed in China may offer both technology and cost benefits. Chinese intellectual-property (IP) development teams are hard at work on both AVS and H.264, as well as on other alternatives.

The two main factors driving the popularity of H.264 are its compression efficiency and its strong jitter resistance in network transmission. For the same image quality, the bit rate required for an H.264 stream is about 36 percent of that required by MPEG-2, 51 percent of that required by H.263, and 61 percent of that required by MPEG-4. Another contender, VC-1 (Windows Media 9), is comparable with H.264 in performance, but progress on that standard outside the PC arena has been slow. Moreover, due to its origin within Microsoft, many companies are cautious about using it.

Each evolution of technical standards offers an opportunity for a new standard to dominate a particular segment. Before a standard wins such a battle, competitors aggressively pursue the new opportunity. China has clearly joined the competition for high-definition-video standards with the introduction of AVS. The AVS workgroup started the effort in June 2002 and is currently working on AVS 1.0.

According to Huang Tiejun, secretary-general of the AVS workgroup, the standard is compatible with MPEG-2 at the system level, and it involves Chinese proprietary IP in the audio/video-compression algorithm. Compared with H.264, Huang believes that the biggest strength of AVS lies in its easy implementation. From the encoding perspective, H.264 requires more than twice the computing power of MPEG-2. For the same image quality, AVS requires about 30 percent less computing power than H.264, Huang claims.

The computing-power advantage that AVS offers arises from the granularity with which the scheme processes an image. H.264 processes an image using 4x4-pixel macro blocks for all applications, from big-screen high-definition TVs to small-screen mobile terminals such as mobile-phones. AVS uses an 8x8-pixel macro block. The larger block does not adversely affect AVS performance in big-screen high-definition applications, but it greatly simplifies the coding algorithm, according to proponents of the technology. In addition, the 8x8 block avoids possible patent conflicts with H.264, the AVS group claims.

HOMEGROWN CHIPS

Although AVS has not officially become China's national standard, Chinese fabless IC companies are working to develop AVS IP and chips. In September 2004, the Ningbo CAS IC Design Centre, attached to the Institute of Computing Technology of the Chinese Academy of Sciences, announced "Phoenix Son 1st," a high-definition decoding IC that supports the format. In March of this year, AVS101, another AVS decoding chip that Beijing-based fabless company Celestial Semiconductor developed, passed expert appraisal. The Hi-Tech R&D program of China (also known as the 863 Program) funded AVS101's development. Clearly, China is attempting to build an end-to-end AVS development chain that covers IP, chips, and eventually systems and operation to boost the chances of the market accepting AVS.

At the same time, AVS-standard-setters promise that they will pursue a low-priced strategy in licensing the technology. Rumours persist that the eventual license fee for each AVS unit may be 1 Chinese Yuan (about 12 cents in the United States). In the past, without proprietary IP of their own, Chinese DVD-player makers had to pay large royalties to the 3C Alliance. The royalties have been a significant impediment to Chinese consumer-electronics enterprises, and therefore, many expect the Chinese market to embrace the low-license-fee strategy of AVS.

Although most state-supported fabless companies are targeting AVS, other private IC-design houses are devoting more attention to H.264. For example, Shanghai Fullhan Microelectronics is dedicated to developing an H.264 IP core. AVS is essentially a simplification of the H.264 standard, according to Yang Xiaoqi, executive director of the company.

Proponents of H.264 question whether AVS can become a widely accepted standard, and specifically whether content owners will support the codec. In the end, content transcends what happens in the semiconductor area in China, just as it does in the rest of the world.

Shanghai Fullhan Microelectronics has released the FH-8600 H.264 standard-definition decoder in the form of an ASIC IP core. The company bases the 300,000-gate FH8600 on a 0.18-micron process. Fullhan is also developing a high-definition decoder core, which it expects to launch in the second half of 2005.

AVS IMPROVEMENTS

The 8x8-pixel macro block in AVS simplifies computation, but it also restricts the capabilities of AVS in the fields of standard-definition video and mobile applications, according to Charles Bian, president of Beijing-based OmniDesign. For this reason, the AVS workgroup is formulating an AVS-M format for mobile applications. OmniDesign is paying close attention to progress in the AVS standard, but it is not involved in the R&D related to the China-generated standard. Meanwhile, the company expects to complete tape-out of its first H.264 decoder IC in July. OmniDesign's first customer will be an American supplier of satellite set-top boxes (STBs). "Satellite STB will be a truly mass-application market for H.264 in 2005," Bian says.

Vendors' division over the next-generation audio/video-compression standards indicates that the dispute over standards will not end any time soon. Some people even believe that various standards will coexist for a long time. Therefore, a codec technology that supports multiple formats is an attractive option for many IC designers.

A design team can usually choose one of two approaches to realise support for multiple codecs. It can integrate on one ASIC multiple codec cores that support different standards, or it can rely on soft decoding, along with a general-purpose processor, such as a DSP. The former certainly is not silicon efficient - especially as the number of codecs to support grows. The latter, meanwhile, involves high implementation cost, high power consumption, and limitations on performance when it comes to processing high-definition streams. So some designers look for a middle approach, between an ASIC and a standard DSP, that offers both performance and flexibility.

OmniDesign has chosen just such a middle-ground approach. Its Multi-Mode Media Processor (M3P) includes a codec processor based on an application-specific hardware circuit. Different from general processor and DSP architectures, this processor targets the media-processing flow in the video codec. The design's application-specific computing power supports high-definition encoding/decoding at relatively lower operating frequency (about 200 to 300 MHz). At the same time, the processor is programmable and can support different standards, thus addressing the demands of a changing marketplace.❖