



C O N E X A N T™

Advanced Video Silicon Enables New Windows 98 Video and Broadcast-Receiver Applications

With Microsoft's release of Windows 98, video and broadcast-receiver capabilities are now supported as an integral part of the operating system. Windows 98 enables a variety of key new multimedia entertainment functions through its inclusion of WebTV for Windows, WavePhore's WaveTop and Intel's InterCast, and through its expanded support for DVD playback. Many consider Windows 98's release to be a watershed event for PC users who want to listen to a stereo radio broadcast or watch TV on their PC, send videomail, videoconference with their friends, or receive content that's broadcast to them via a variety of new data broadcast services.

To make these applications possible, software and silicon have converged to create a seamless new video and broadcast-reception environment under Windows 98. This convergence has spawned a new class of audio and video streaming hardware devices that leverage the power of highly integrated silicon and the convenience of an operating system that makes it extremely easy to integrate video products onto today's PC platform. Windows 98 has ushered in the following associated developments related to PC video technology:

- The industry's first universal set of video hardware drivers
- The first video-decoder processor chips to fully support the WebTV for Windows PC TV and broadcast-receiver initiative, while providing a choice of two highly effective silicon integration strategies
- Video encoder silicon to support the DVD playback capabilities built into Windows 98
- Comprehensive bundled silicon offerings that provide complete decoder and tuner solutions

The WDM Driver Environment

The technology behind today's Windows 98 video and broadcast-receiver environment has its roots in innovations that Conexant first provided to Microsoft during 1996 and 1997 for Microsoft's Win32 Driver Model (WDM) Driver Development Kit (DDK).

As the first set of video-capture drivers for a Windows operating system, the WDM DDK was designed to enable enhanced video capabilities and provide built-in hardware support. To create the WDM, Microsoft took core driver technology developed for Conexant's first-generation Bt848 video-capture processor chip, and used it to create a common driver architecture for Windows and Windows NT operating systems. This allowed hardware developers to focus on a single set of drivers that would exploit the full feature set of their hardware across both operating systems.

Conexant's Bt848 was the first silicon to implement this WDM architecture. Introduced in mid-1996, it used an innovative new architecture that gave OEMs one of the easiest, least costly ways possible to add high-quality videoconferencing and other video-capture functionality into PCs or easy-to-integrate add-in cards.

The biggest cost-cutting feature of the Bt848 was its PCI bus-mastering architecture, which allowed it to connect directly to the PCI bus as a completely graphics-independent solution. The architecture's intelligent DMA engine and PCI bus master module enabled a real-time, full-resolution CCIR601 video stream to be captured directly into PC system memory. This was a fundamental step on the road to today's Windows 98 streaming audio and video capabilities, and helped spur the first crop of video-enabled hardware products from companies like ATI and Hauppauge Computer.

Two Decoder Chip Architectures Meet Demand Fueled by WebTV for Windows

With the WDM foundation in place, Microsoft's WebTV for Windows is expected to provide the major thrust behind growing demand for PC video-decoder functionality.

WebTV for Windows is a key Microsoft initiative aimed at bringing TV to the PC and using a portion of a traditional broadcast channel as a pathway for Internet content. It brings TV reception to the desktop, provides an interactive TV guide, and allows data to be broadcast to the PC. Conexant believes that interest in the WebTV for Windows function is one of the primary factors that will increase TV tuner card shipments from their current rate of 5 million units annually to more than double that over the next 18 months.

To serve this market, Conexant is the first silicon supplier to provide a family of video decoder chips that fully support WebTV for Windows. Conexant has pursued two silicon architectures with which OEMs can quickly integrate this capability into their PCs and add-in cards.

The first architecture is the PCI bus-mastering approach introduced by Conexant with its Bt848 chip. Conexant has now carried this concept forward with the release of its second-generation Fusion family of broadcast media processors. Introduced in the fall of 1997, Conexant's Fusion processors fuse capture functions for video, TV, broadcast audio and stereo FM radio into a comprehensive, single-chip broadcast-receiver device that supports the full range of videoconferencing, video email, video and still editing, stereo PC TV and radio, and broadcast-receiver applications. Conexant's Bt878 is a low-cost video and mono television audio capture solution, while the Bt879 provides FM stereo radio and industry-standard BTSC stereo decoding, while also employing certified dbx noise reduction techniques. The validity of the PCI bus-mastering concept is borne out in Conexant's having shipped more than 2 million units to date.

Meanwhile, companies like Conexant have also continued to pursue cost and integration improvements with a second silicon approach, one that allows OEMs to use a base system design onto which various level of video support can quickly be added. This strategy requires the use of a video-capture architecture that supports a video-attach system partitioning strategy, as embodied by products like Conexant's latest NTSC/PAL/SECAM video decoder, the Bt835.

The Bt835 minimizes the cost of integrating video-capture functions, first by offloading YcrCb-to-RGB color space conversion to the downstream controller, and then by using its multi-tap filtered video downscaler so the video controller can accept a high-quality user-scaled image with no further video processing. At the same time, solutions like the Bt835 don't have to skimp on scaling quality, either. The Bt835 is the only solution in its price range to use an advanced 2H adaptive Y/C separation comb filter that eliminates the video artifacts and reduced vertical resolution that occur with 1H comb filters.

Additionally, the Bt835 filter's sophisticated logic switches on a pixel-by-pixel basis to greatly reduce comb filter failures on non-vertically-correlated images, while simultaneously maintaining full vertical and horizontal resolution. The result is the highest-quality video input solution available for low-cost PC multimedia subsystems that integrate both graphics acceleration and video capabilities on a single add-in card or directly on the PC motherboard.

Together, Conexant's two video decoder architectures have captured a more than 50 percent share of the total video decoder chip marketplace. As this market continues to grow, there are also opportunities for accelerated market growth on the video-encoder side of the PC system.

The Flip Side: Video Encoder Silicon for DVD Playback

In addition to spurring opportunities for bringing video into the PC, Windows 98 has created greater opportunities for applications that push video out of the PC. This requires video encoding technology that allows users to display PC data or PC-based DVD movies on their television screens.

Conexant's Bt868 and Bt869 chips are examples of the advanced video encoder silicon that is now available to OEMs. These video encoder chips let end-users transfer PC applications to their TV and still maintain the same video quality viewed on a VGA PC monitor. They combine features such as a flicker-free video architecture, programmable scalability and input pixel blanking to provide a comprehensive, low-cost solution for superior quality "living room PC" applications using desktop or notebook computers. Conexant's Bt868 and Bt869 video encoders enable a variety of living room PC applications by leveraging Conexant's UltraScale™ technology, which uses line-conversion technology to provide advanced vertical and horizontal scaling despite the difficult process of displaying non-interlaced video on interlaced devices such as the TV. Conexant encoders also use the most advanced 5-line flicker-filtering architecture available, with eight Luma flicker filter settings and eight Chroma flicker filter settings that provide the horsepower for OEMs can create end-user applications with superior TV-out quality for web pages, games, word processing, presentations and spreadsheets.

Another factor influencing the quality of PC TV display is the sophistication of the digital-to-analog conversion technology that is used. Conexant uses 10-bit DAC encoder technology to optimize quality in such price-sensitive consumer electronics applications as video DBS boxes, DVD players, and video CD players. Conexant has also included a number of features that are exclusive to its Bt868 and Bt869 video encoders, including a fully programmable overscan compensation architecture that makes the entire TV area viewable. The chips also feature low-power operation, support for both pixel-based and character-based clocking through the use of a blank signal, and the most flexible input pixel format of 8-, 16-, and 24-bit interface modes.

Future Developments

Until the advent of Windows 98, it would have been hard to foresee the smooth or rapid development of a broad, mainstream market for video-enabled applications. Industry leaders had made impressive early forays into the marketplace with a variety of fun, first-generation applications. But even a major "killer application" would have had difficulty creating critical-mass appeal without a more cohesive hardware and software platform beneath it.

Now, we can expect to see accelerating activity on multiple fronts. Companies like Conexant continue to push forward and integrate more features and functionality into their silicon. At the same time, there is the opportunity to offer bundled turnkey silicon solutions to speed time to market for a variety of products. Conexant's recent announcement with TEMIC of Grossmehring, Germany, is a good example: the relationship has allowed Conexant to offer video decoder products along with TEMIC multimedia tuners as a single device set. This provides Conexant customers with an integrated and competitively priced line of decoder/tuner solutions to address new "convergence" markets that demand TV functionality on a PC platform. Conexant's Broadcast Media Device Sets include a choice of Conexant's Bt878 and Bt879 Fusion processors or Bt835 video decoder, along with TEMIC's new 4039 series of compact RF front-end products.

The inclusion of broadcast video and data capabilities in Windows 98 is a key step toward mainstreaming video-enabled applications and turning the PC into the kind of powerful multimedia and entertainment platform that many believe it's destined to become. Perhaps more importantly, the combination of Windows 98's video-friendly operating system, the WDM's universal driver architecture, and today's choice of multiple robust silicon platforms creates a powerful mix of ammunition with which hardware and software suppliers can now aggressively attack this potentially explosive new market.

Other developments are just around the corner. The Windows 98 video and broadcast-receiver environment is analog-centric today, but will provide an excellent foundation as video moves into the digital domain with High Definition TV (HDTV) and digital cable modems. Also, the PCI bus-mastering architecture that Conexant has innovated for today's Windows 98 video and broadcast-receiver applications is ideal for ushering in tomorrow's digital technology.

This is especially true in the case of digital cable modems, where communications functions can only co-exist with video and broadcast-receiver functions if they both reside on the high-performance PCI bus. Conexant currently has development programs underway across the full range of satellite receiver, HDTV and cable modem technologies, and sees a bright future for merging these new capabilities into today's new WDM-enabled Windows 98 software and silicon platform.

Product Pricing and Availability Information

Conexant's Bt878, Bt879, Bt835 and Bt869 video products are in volume production. Conexant's Broadcast Media Device Sets are also available in sample quantities with production scheduled to begin in July. Pricing in 100-piece quantities is \$22.65 for the Bt878, \$24.65 for the Bt879, \$12.92 for the Bt835, and \$12.50 for the Bt869.

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