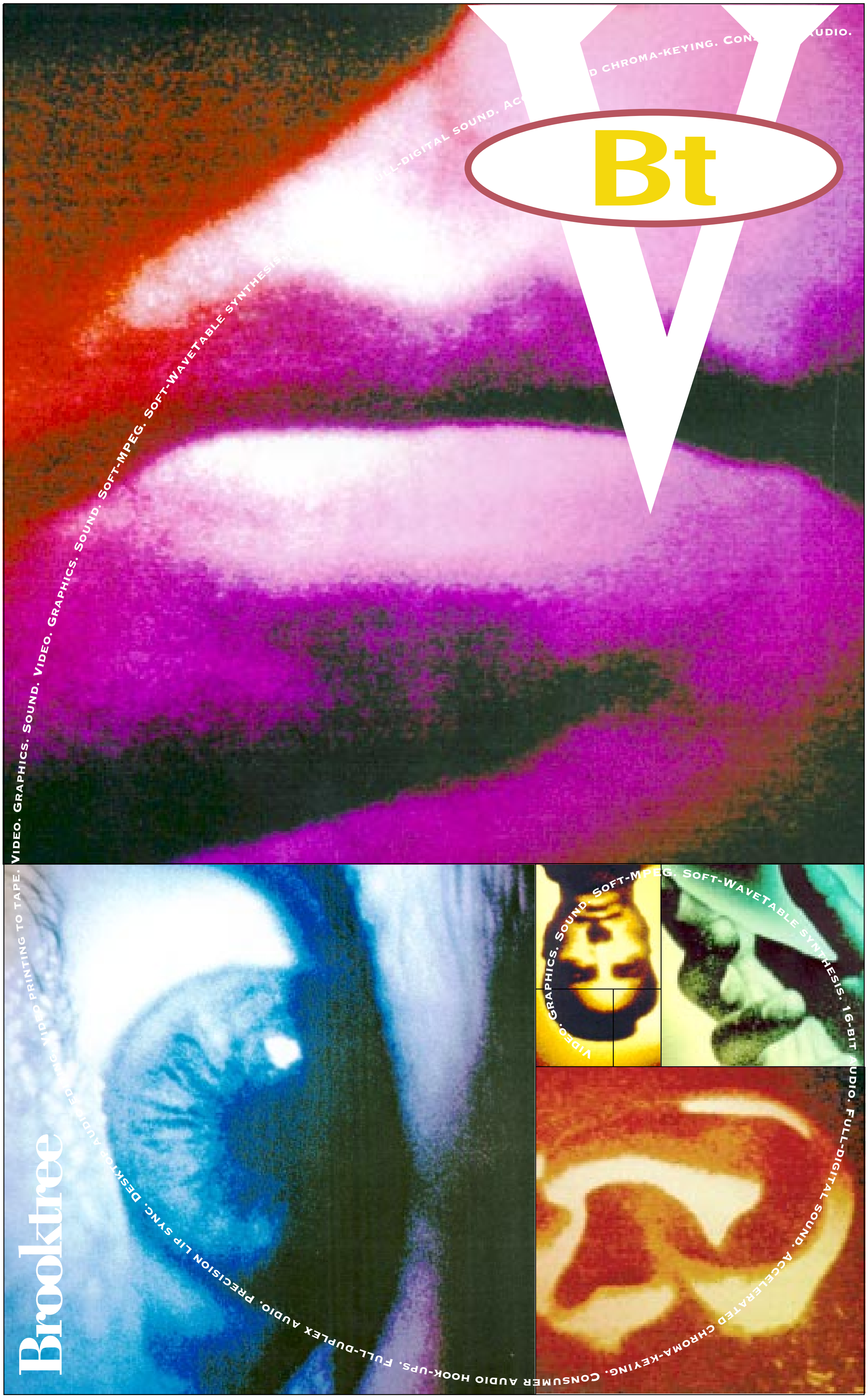
BtV MediaStream Family

Product Guide and Overview



DISH-1011
IPR2019-01167
U.S. Patent No. 6,028,643

Introduction

Brooktree's BtV® MediaStream™ family of highly integrated multimedia components represents the first complete solution offered by a single supplier for the latest generation of media-enabled applications. The BtV MediaStream family brings together Brooktree's mixed-signal technologies in graphics, video, audio, and DSP to provide unprecedented performance and efficiency in a single unified architecture. By integrating this powerful hardware technology with a comprehensive software support library of utilities, drivers, and BIOS (including Microsoft® Plug and Play™ compliance), BtV allows OEMs to quickly bring comprehensive multimedia capability to the market.

Brooktree defined BtV from the ground up to achieve the most efficient use of silicon, memory, and CPU cycles for multimedia functions. This resulted in the patented *MediaPacket Architecture* that provides the most efficient multimedia accelerator system in an extensible architecture.

This document provides an overview of the architecture and the resulting components, software, and support which comprise the entire BtV MediaStream family.

Print Date 4/14/95

Printed in the United States of America.

Table of Contents

Traditionally, graphics, video, and audio subsystems utilized separate memory spaces and bus connections because of independent controllers with incompatible data types. Wasted memory space and memory bandwidth, duplicated bus interface logic, and wasted CPU cycles to manage independent subsystems resulted. Consequently, the cost of providing these capabilities has been an expensive proposition.

The BtV MediaStream family, made for the mainstream PC market, solves this problem with the *MediaPacket Architecture* that integrates the disparate data types of graphics, audio, and video. At the heart of the *MediaPacket Architecture* is a single media controller that works with a common buffer that is capable of caching the various multimedia data types. This buffer is called the *MediaBuffer*™.

Audio, video, and graphics are each stored in their native formats within the *MediaBuffer* but are managed by the central controller. The MediaStream family media controller contains interfaces to separate subsystems that manage the flow of graphics, digital video from the system bus, external composite video, and audio to and from the system (Figure 1). Since connection is through a single controller, a single interface point is established for the host system. This provides efficiency in both hardware cost and the software overhead required to manage the various media elements.

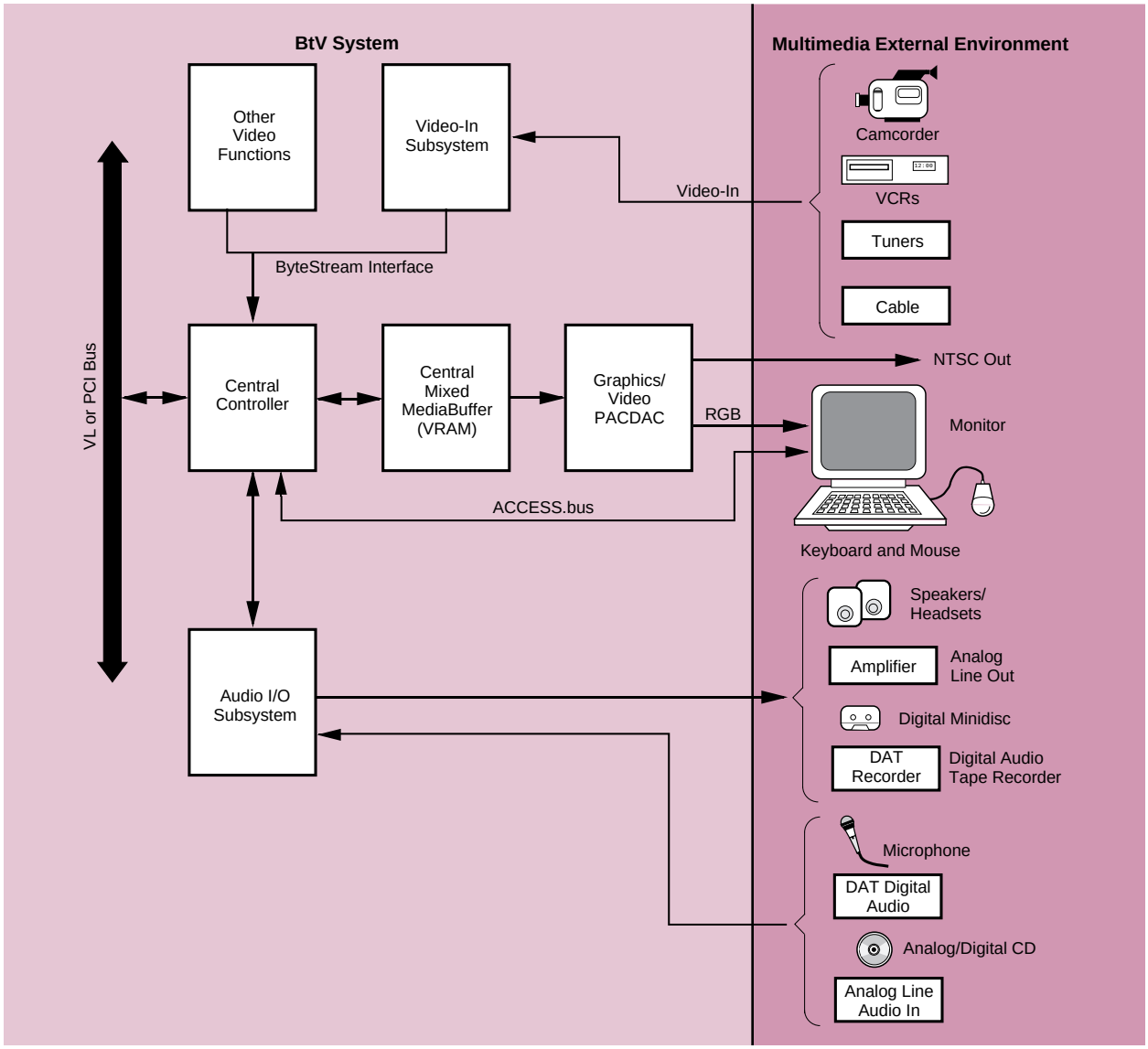


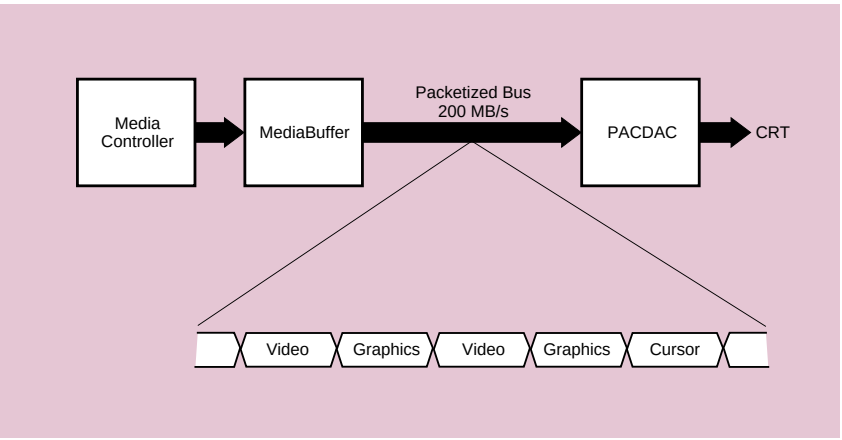
Figure 1.
BtV Architecture
Conceptual View

Packet Interface Maximizes Efficiency

The *MediaBuffer* is connected to a next generation RAMDAC called the PACDAC™ Packetized Data DAC. To maximize storage efficiency and bandwidth between the *MediaBuffer* and the PACDAC, the MediaStream family incorporates the *MediaPacket Architecture*, a patented technique for managing the flow of graphics, cursor, control, and video to the PACDAC. This unique architecture incorporates packet-style data flow from the *MediaBuffer* to the PACDAC such that graphics and video can utilize the entire serial bandwidth available from the *MediaBuffer*'s serial port (Figure 2). Normally during horizontal and vertical blanking, the frame buffer serial port is not providing serial data to the DAC and is inactive. This inactive time can represent up to 30 percent of the total horizontal line time. The PACDAC contains internal FIFOs that can be filled during this inactive time, resulting in video playback capabilities beyond that which could otherwise be done because of increased effective bandwidth between the *MediaBuffer* and the PACDAC.

The graphics and video data are logically separated within the physical *MediaBuffer*, allowing each to reside in its own color space. The PACDAC performs the necessary color space conversions and scaling needed to generate the analog RGB outputs. The graphics buffer does not need to conform to the color depth of the video buffer, enabling more efficient use of *MediaBuffer* memory space. For example, a 1 MB memory configuration can support 1024 x 768 x 8 or 1280 x 1024 x 4 graphics while also supporting true-color video playback. Another benefit of separate video and graphics storage areas is that higher video quality can be maintained even when graphics are operating in pseudo-color modes. This is because graphics can be maintained in pseudo color-space (4 or 8 bits per pixel) while still allowing the video buffer to be in video color space (YCrCb). This improves the quality of the video presentation and eliminates palletized video commonly seen in other video implementations.

Figure 2. Packet Bus Between MediaBuffer and PACDAC



The packet interface and associated PACDAC FIFOs decouple the VRAM's serial clock (SCLK) from the pixel clock (PCLK) of the PACDAC. Normally, the data rate that the frame buffer feeds pixel data to the RAMDAC must be matched to the pixel clock requirements. This is usually accomplished either by dividing the pixel clock (PCLK) or by using a PLL to generate a synchronous serial clock to the frame buffer, depending on the specific multiplexing provided by the RAMDAC. This wastes considerable available bandwidth from the serial port of the frame buffer. For example, a RAMDAC with a 135 MHz pixel clock and a 4:1 input multiplexer sets the frame buffer's serial clock at 33.75 MHz (135/4). With 50 MHz serial rate VRAMs, 16.25 MHz of wasted bandwidth results—33 percent of its capabilities.

Another source of unused bandwidth in conventional architectures may be found in the "dead" time of horizontal scan lines. Since no pixels are generated during horizontal retrace, the frame buffer serial port is inactive during this time. Because pixel data is synchronized within the PACDAC using FIFO buffers, this unused bandwidth is now available for transfer of additional graphics, cursor, or video data. This FIFO interface is shown in Figure 3.

The packet interface takes advantage of this unused bandwidth to provide enhanced video capability. The PACDAC will support up to a 75 MHz SCLK. As higher speed VRAMs are introduced into the market, the increased bandwidth becomes instantly available to the BtV system.

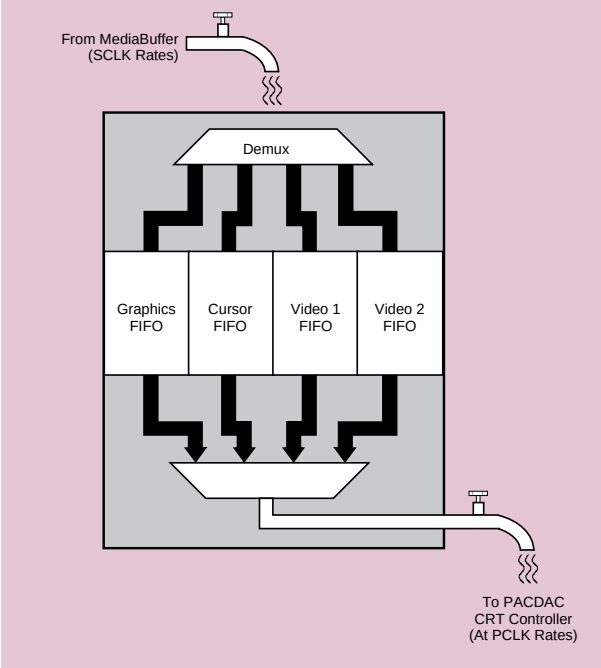


Figure 3. Decoupling SCLK from PCLK in the PACDAC

Memory Space Efficiency

In MediaStream systems, memory *space* in addition to memory *bandwidth* is also efficiently managed. For example, when displaying full-motion video windows, the *MediaBuffer* only needs to store the video in its native size (for example 320 x 240).

Full bilinear interpolation is performed within the PACDAC to scale to larger video windows minimizing both the *MediaBuffer* storage and bandwidth demands.

Feature-rich implementations may be configured using minimum memory since only the amount of *MediaBuffer* required for the desired feature set needs to be provided. A list of the memory requirements for various *MediaBuffer* elements is given in Table 1.

Table 2 lists some typical configurations in pixel formats, color depth, and video formats and the resulting *MediaBuffer* size requirements. This is a representative sample for comparison purposes and does not represent all of the modes of a BtV system.

As can be seen from Table 2, the MediaStream family provides full 1024 x 768 x 8 graphics with true-color video capability up to full-screen resolution in only 1 MB of memory. This represents a cost advantage over other DRAM and VRAM solutions by halving the memory requirements for this baseline configuration.

A Complete Audio Solution

A multimedia solution would not be complete without one important ingredient—audio.

The BtV MediaStream family provides a stereo audio solution that tightly couples the audio system to the video and graphics system. This results in a single suite of software drivers that handle all of the necessary data types of graphics, audio, and video. This unified set of software drivers eliminates driver and hardware contention problems, resulting in more reliable and serviceable operation and reduced help desk support calls.

In the MediaStream family, access to the audio subsystem is accomplished by way of the controller's attachment to the high-speed VESA local bus or PCI bus. Combining this high-speed bus connection with

Table 1. MediaBuffer Storage Requirements

	Element	MediaBuffer Space Required (K bytes)
Graphics	640 x 480 x 8 640 x 480 x 24 1024 x 768 x 8 1024 x 768 x 16 1024 x 768 x 24 1280 x 1024 x 8 1280 x 1024 x 16	300 K 900 K 768 K 1536 K 2304 K 1280 K 2560 K
Video (YCrCb 4:1:1)	160 x 120 240 x 180 320 x 240	30 K 90 K 120 K
Video (YCrCb 4:2:2)	160 x 120 240 x 180 320 x 240	60 K 90 K 150 K
Audio	Audio Support[1]	32 K
Control	Control Overhead	8 K
Acceleration	Graphics Workspace[2]	32 K

[1] 32 K buffer is recommended for Windows Audio.

[2] 32 K is recommended for Windows Display Driver Workspace. This enables graphics command queueing and other high-performance features. In addition, the Display Driver will use all otherwise unused memory for font caching.

MediaBuffer Requirements		Graphics Pixel Format and Color Depth												Native Video Size and Number of Active Windows (Note 1,2)						Audio Buffering	Control Overhead	Acceleration Workspace
		640 x 480				800 x 600				1024 x 768				1280 x 1024				160 x 120		240 x 180		320 x 240				
		8	16	24	32	8	16	24	32	4	8	16	24	4	8	16		4:1:1	4:2:2	4:1:1	4:2:2	4:1:1	4:2:2			
1 MB MediaBuffer		✔																2	or 2	2	or 2	2	or 1	✔	✔	✔
			✔															2	2	2	2	2	1	✔	✔	✔
				✔														1	0	0	0	0	0	✔	✔	✔
						✔												2	2	2	2	2	1	✔	✔	✔
										✔								2	2	2	2	2	1	✔	✔	✔
											✔							2	2	2	2	1	1	✔	✔	✔
														✔				2	2	2	2	2	1	✔	✔	✔
2 MB MediaBuffer			✔															2	2	2	2	2	1	✔	✔	✔
				✔														2	2	2	2	2	1	✔	✔	✔
						✔												2	2	2	2	2	1	✔	✔	✔
							✔											2	2	2	1	1	1	✔	✔	✔
	Note 3							✔										1	1	1	0	0	0	✔	✔	✔
										✔								2	2	2	2	2	1	✔	✔	✔
	Note 3										✔							1	1	1	1	1	0	✔	✔	✔
	Note 3														✔			2	2	1	1	1	1	✔	✔	✔
3 MB MediaBuffer	Note 3							✔										1	1	1	0	0	0	✔	✔	✔
	Note 3											✔						0	0	0	0	0	0	✔	✔	✔
	Note 3															✔		0	0	0	0	0	0	✔	✔	✔

This table has been created assuming VRAM with a 50 MHz SCLK, and with all modes running at 75 Hz refresh rate, except 1024 x 768 x 24 which is running at 70 Hz refresh rate and 1280 x 1024 x 16 which is running at 60 Hz refresh rate.

Note 1 Native video size is the format of video as stored in the MediaBuffer. This is not the size as displayed on the screen. The PACDAC performs linear interpolation to scale the video to arbitrarily sized windows.

Note 2 The columns show the maximum number of video windows of each particular format and size. The overall maximum number of video windows at any one time is two. The maximum number of 320 x 240 YCrCb 4:2:2 video windows is one.

Note 3 The video window capabilities of these modes are limited by VRAM serial bandwidth, not by memory requirements.

Table 2. MediaBuffer Size Examples

the ability to transfer bursts of audio data to and from the *MediaBuffer* results in reduced CPU workload and a more efficient use of bus resources.

Because audio data is stored in the *MediaBuffer*, applications have the capability to cache sound clips within the *MediaBuffer* in anticipation of actual playback. When the application wishes to play an audio clip, it merely changes pointers within the controller to instruct playing of the desired audio clip. Likewise, the media controller can be instructed to loop on a specific audio clip. This would be useful, for example, if the application wished to play background audio. This caching capability provides a powerful mechanism for off-loading the CPU from tedious ISA bus access.

Coupling the audio to the graphics and video system with unified software also facilitates full lip synchronization. As users' expectations rise to 30 frame-per-second video, accurate lip synchronization will become an important capability. BtV MediaStream contains hardware designed to assist in synchronizing audio with video streams sourced from video capture or from decompression.

The Media Accelerator

What has resulted from the *MediaPacket Architecture*? The BtV MediaStream family represents an important milestone in the evolution of the GUI accelerator. For the first time, a complete solution to the problems of bringing cost-effective graphics, video playback, and audio to the multimedia platform is offered, creating a new product category called Media Accelerator (MA) (Figure 4).

What does a *Media Accelerator* offer the system designer?

- Minimum component count with no hardware redundancy
- Lowest solution cost for graphics, video playback acceleration and audio
- Single CPU bus interface (VL or PCI)
- Ability to deliver 1024 x 768 x 8 or 1280 x 1024 x 4 graphics and a true-color video window in only 1 MB of memory
- Maximized system bandwidth, providing maximum potential for full motion video playback

From an end user perspective, the BtV MediaStream family allows the OEM to feature the following benefits:

- High-quality video and graphics acceleration and industry sound board compatibility for a variety of media-enabled applications on a single add-in card or motherboard.

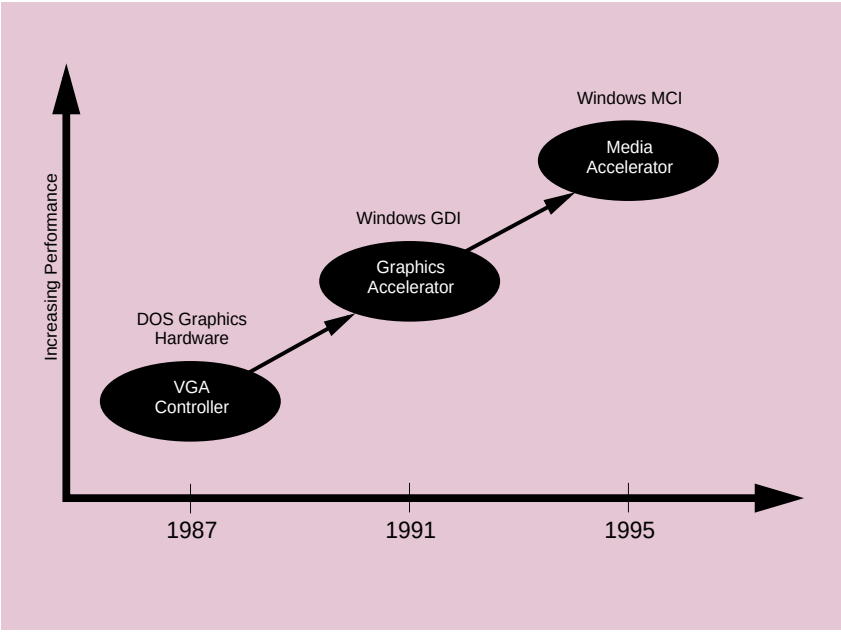


Figure 4. Media Accelerator—A Natural Evolution

- Quality video playback acceleration, audio, and high-performance graphics in a baseline user configuration at the market's volume price point.
- Easy installation. Single subsystem helps facilitate plug and play capabilities.
- Reduced conflicts with user-installed components.
- BtV MediaStream family's unique architecture boosts the CPU's efficiency to achieve effective multimedia performance for entry-level 486 and Pentium configurations.

The BtV MediaStream product family comprises the BtV2115 MediaStream Controller, the BtV2487 PACDAC Packetized Data DAC, the BtV2300 AudioStream Interface, and the BtV2811 VideoStream Decoder. These components allow a multimedia subsystem to be configured that meets the needs of a variety of applications. The BtV2115 MediaStream Controller is the "hub" of the BtV MediaStream family's MediaPacket Architecture providing a central point of control of all graphics, audio, and video functions.

The *MediaPacket Architecture* is designed to be extensible so that future development in media encoding/decoding or the addition of different media types can be quickly incorporated with minimal impact to the host system. The BtV2115 MediaStream Controller contains a bytestream interface for connecting a variety of features including the VideoStream Decoder and MPEG decoders. In addition, the MediaStream Controller provides connections to game and MIDI ports (Figure 5).

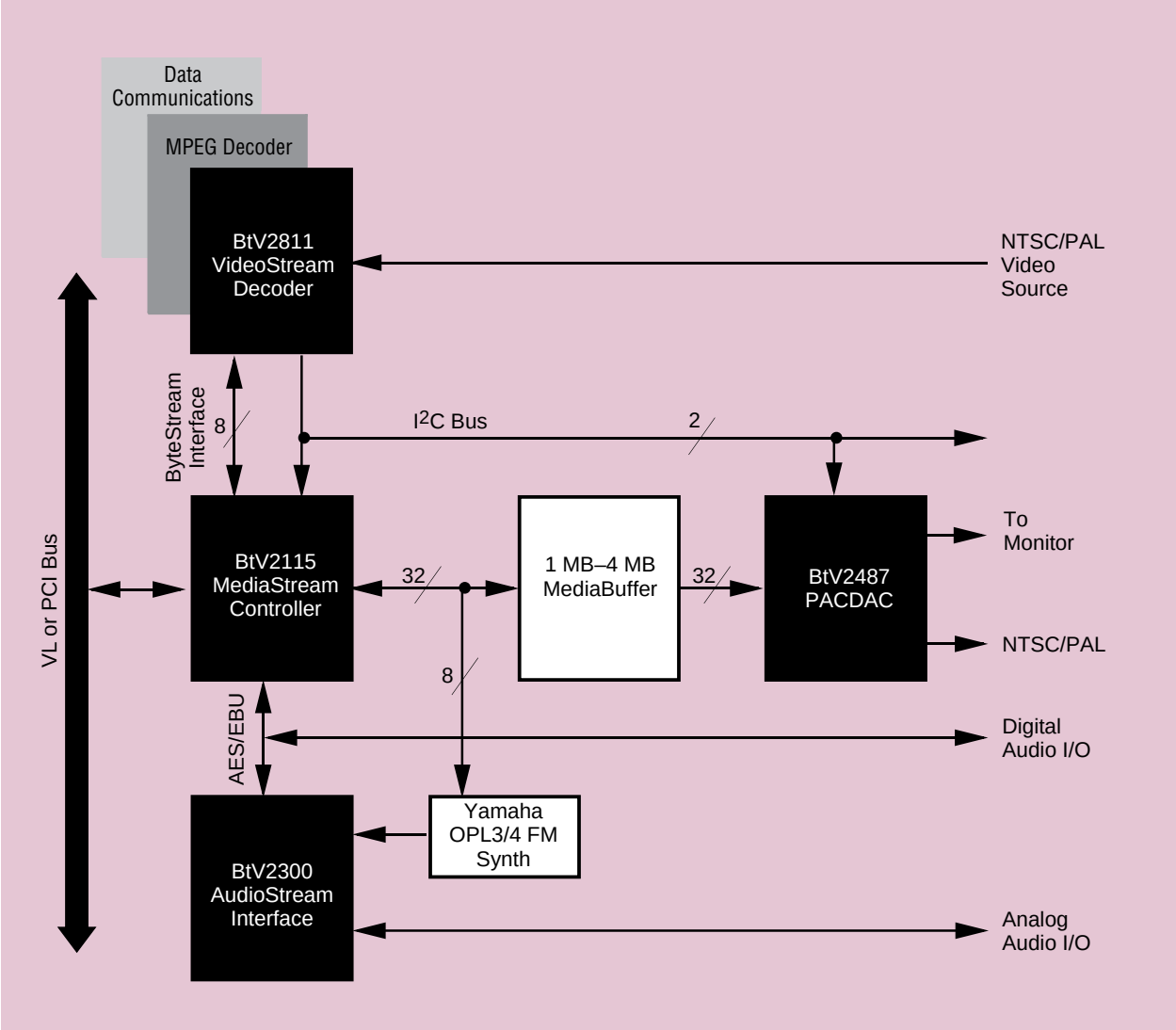


Figure 5. BtV MediaStream Family System Block Diagram

The MediaStream Controller provides graphics performance that satisfies the needs of today's GUI environments such as Microsoft Windows 3.1. Integrated with the latest in GUI accelerator hardware, the MediaStream Controller provides a full complement of graphics primitives. Graphics hardware acceleration is provided for a full range of pixel formats and pixel depths from 640 x 480 x 32 through 1280 x 1024 x 16.

The MediaStream Controller is a multimedia acceleration engine that incorporates internal clock quadrupling circuitry allowing the internal data paths to operate at up to 100 MHz. This allows more efficient gate and pin utilization while resulting in the highest performance obtainable when using media-enabled applications.

The MediaStream Controller provides up to 100 MB/s of bandwidth to the MediaBuffer while the PACDAC enjoys up to 200 MB/s from the MediaBuffer serial port bandwidth. Because dual port MediaBuffer is utilized, no compromise is made to graphics and video performance when high resolution or refresh rates are desired. To accelerate graphics operations, graphics primitives such as BitBlt and line draw are provided. A FIFO can buffer up to 8192 commands permitting essentially full overlap of application and graphics command execution. In addition, the MediaStream Controller's result FIFO automatically detects opportunities to use block writes to VRAM, resulting in much higher memory bandwidth.

The MediaStream Controller supports the pixel formats shown in Table 3.

	4 Bits/Pixel	8 Bits/Pixel	16 Bits/Pixel	24 Bits/Pixel	32 Bits/Pixel
640 x 480	75 Hz	75 Hz	75 Hz	75 Hz	75 Hz
800 x 600	75 Hz	75 Hz	75 Hz	75 Hz	75 Hz
1024 x 768	75 Hz	75 Hz	75 Hz	70 Hz	N/A
1280 x 1024	75 Hz	75 Hz	60 Hz[1]	N/A	N/A

[1] 72 Hz using VRAM with 60 MHz SCLK rate.

Table 3. Supported Pixel Formats and Screen Refresh Rates using 50 MHz VRAM

From its inception, the BtV MediaStream family was designed with video in mind. The BtV MediaStream family incorporates the video functions necessary for a wide variety of multimedia applications—from basic video playback to full multimedia authoring applications. Features range from highly efficient video playback acceleration to NTSC I/O options to a unique chroma-key capability.

Full-Motion Video

As video playback in PCs becomes a standard and required feature, video quality will become a differentiating factor among PCs. The MediaStream Controller provides full motion video acceleration under Microsoft's Video for Windows (VfW). The controller accelerates up to two native format 30 fps 320 x 240 resolution VfW sessions. The controller also provides bilinear interpolation for scaling to window size.

To complement video playback capability, the MediaStream Controller, when used in conjunction with the BtV2811 VideoStream Decoder, provides NTSC/PAL capture and simultaneous display of live video for multimedia authoring, video editing, archiving, or live video in a window applications (Figure 6).

Video Playback Acceleration

The BtV MediaStream family contains hardware for accelerating software video decompression by offloading the time-consuming color space conversion and scaling operations from the system CPU. The MediaStream Controller provides multiple virtual frame buffer views into the same physical memory, allowing transparent bit, byte, and word order flipping, as well as video color component access. This allows software algorithms to take advantage of the CPU's large block move instructions rather than having to manually perform the component reordering within the innermost loops of the decompression algorithm. Depending on the algorithm, pixel throughput increases of 2–10 times are achievable over conventional linear-only frame buffer architectures.

Why are these features important? Figure 7 illustrates a histogram of processor-elapsed time by function within an MPEG-1 software-based decoder on a Digital Equipment Corporation Alpha processor. Similar results were obtained for motion JPEG (MJPEG) and Px64 video decoding. As can be seen, clearly in excess of 40 percent of processor time is spent in color space conversion and display management.

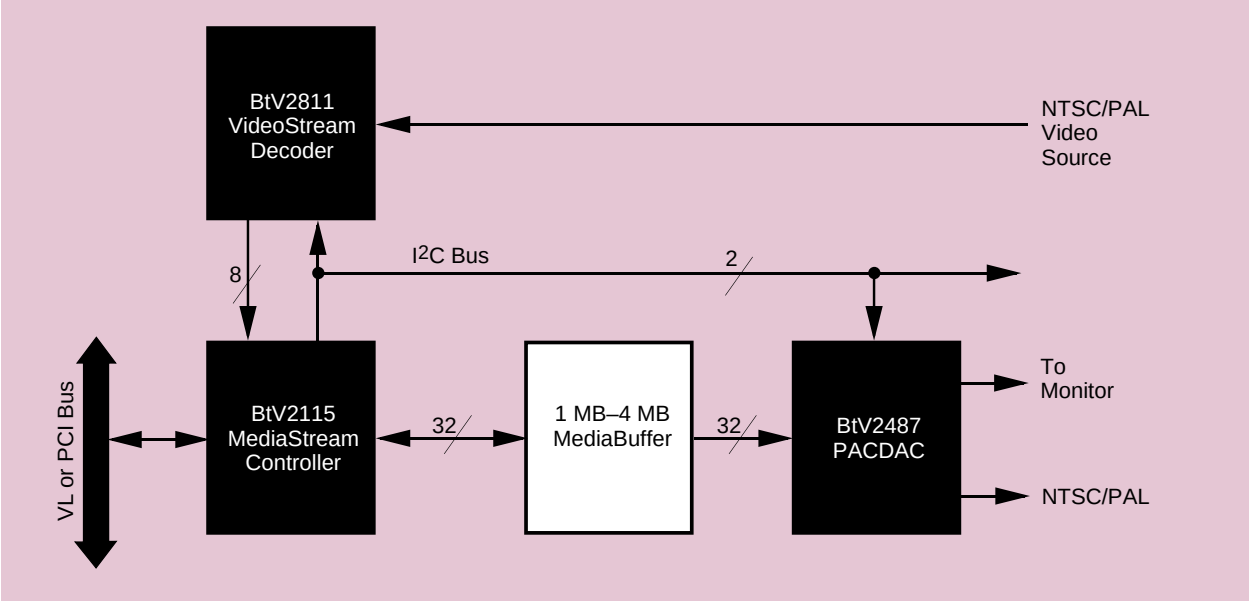


Figure 6. BtV MediaStream System with Graphics and Video Acceleration with Video-in Option

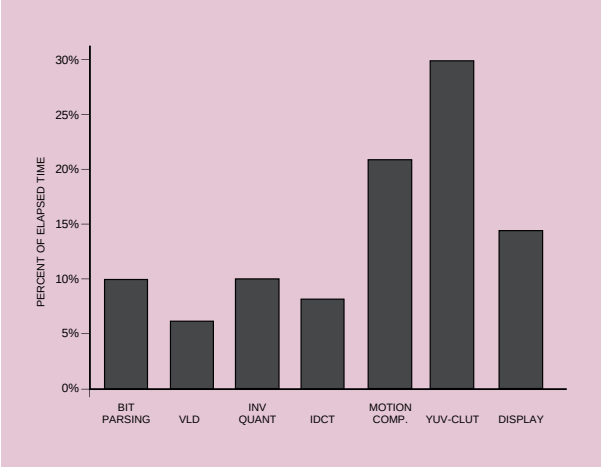


Figure 7. Where the Time is Spent. MPEG-1 (SIF Resolution 352 x 240) at 30 fps on 275 MHz Alpha AXP[1]

In a MediaStream family system, the processor is off-loaded from much of this function allowing more processor cycles for multitasking chores.

Brooktree's BtV MediaStream family display drivers include the Microsoft's Display Control Interface (DCI) extensions that allow DCI-compliant video compressors and decompressors (codecs) to efficiently take advantage of the MediaStream family's video acceleration capabilities. Besides Video for Windows codecs like Video 1, Indeo and Cinepak, the Media Stream family also accelerates two other forms of video decompression algorithms; the Mediamatics MPEG-1 "MPEG Arcade™ Player" and the Horizon Technologies "TrueMotion®–S." Both of these algorithms are high-quality, efficient video decompressors that, with the help of the MediaStream video acceleration hardware, can replace expensive decompression boards and devices.

Chroma-key

The BtV MediaStream family provides a unique video acceleration feature that is ideally suited to leading-edge video applications and is fully DCI compliant. Chroma-keying provides the ability to overlay a video source on top of a graphics display for applications ranging from high-performance gaming to virtual reality.

Chroma-keying is based upon the application of a single-bit alpha mask which, when embedded in the video bit stream to the MediaStream Controller, provides the video keying necessary to overlay the video on top of the graphics display.

To take advantage of MediaStream family chroma-keying, an alpha mask that identifies the extents of the video overlay must be created and encoded with the video stream when the application is authored, as shown in Figure 8. By doing this, playback of the keyed video is handled automatically in MediaStream hardware during playback (Figure 9).

The BtV MediaStream family chroma-keying allows very complex keying to be embedded directly in the video stream that adds realism to high-performance games and virtual reality applications.

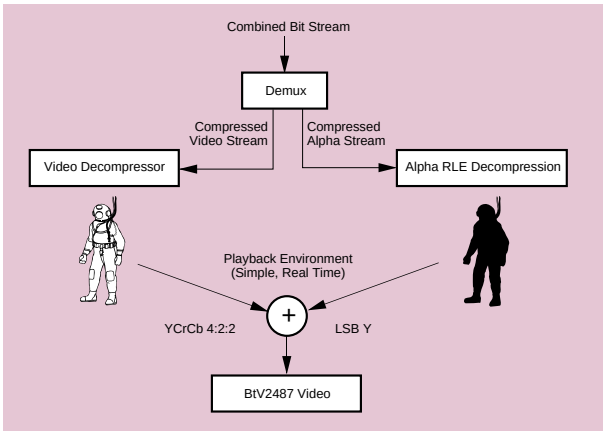


Figure 8. BtV MediaStream Family Embedded Video Keying

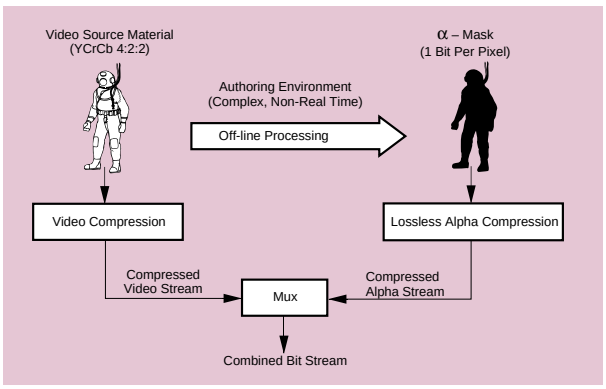


Figure 9. BtV MediaStream Family Chroma-key Authoring Environment

[1] *Source: Digital Equipment Corp., Microsoft Windows Hardware Engineering Conference (WinHEC'94)*

Live Video Input

Having the ability to capture full-motion video from an NTSC/PAL composite source is critical to applications such as:

- Authoring multimedia titles that contain motion video
- Providing television in a window
- Video teleconferencing
- Video frame capture for desktop publishing applications
- Image processing systems
- Desktop video editing systems

Using Brooktree's BtV2811 VideoStream Decoder provides a cost-effective solution. The VideoStream Decoder is a single-chip, NTSC/PAL, composite and S-Video decoder and scaler that contains a glueless interface to the MediaStream Controller.

Live video display is handled efficiently by the BtV MediaStream system. This can best be illustrated by comparing the flow of video within a traditional controller system versus the flow of video within a MediaStream system. Video, usually in component video format (YCrCb) is generated by an NTSC/PAL decoder (such as the BtV2811). The resultant video is written into an off-screen video buffer within the graphics subsystem. The controller is then responsible for color space converting (to RGB format), scaling, and rendering into the display frame buffer (Figure 10). For full frame rate video to occur, this must be done at 30 frames per second. This can result in required data rates in excess of 50 million bytes per second between the controller and the frame buffer (assuming full-screen 1024 x 768 at 30 fps). Because this bandwidth is seldom available, compromises are made by reducing the frame update rate so that "jerky" video results. This consumption of bandwidth also cannibalizes the bandwidth normally available for graphics functions. As a result, graphics performance suffers when one or more video windows are displayed.

The BtV MediaStream family provides a more efficient solution (Figure 11). The MediaStream Controller and the PACDAC work in concert to bring video to the screen. The PACDAC contains on-chip FIFOs for graphics, cursor and video, on-chip color space conversion, and full arbitrary size bilinear X-Y interpolators for scaling to fit any window size. As a result,

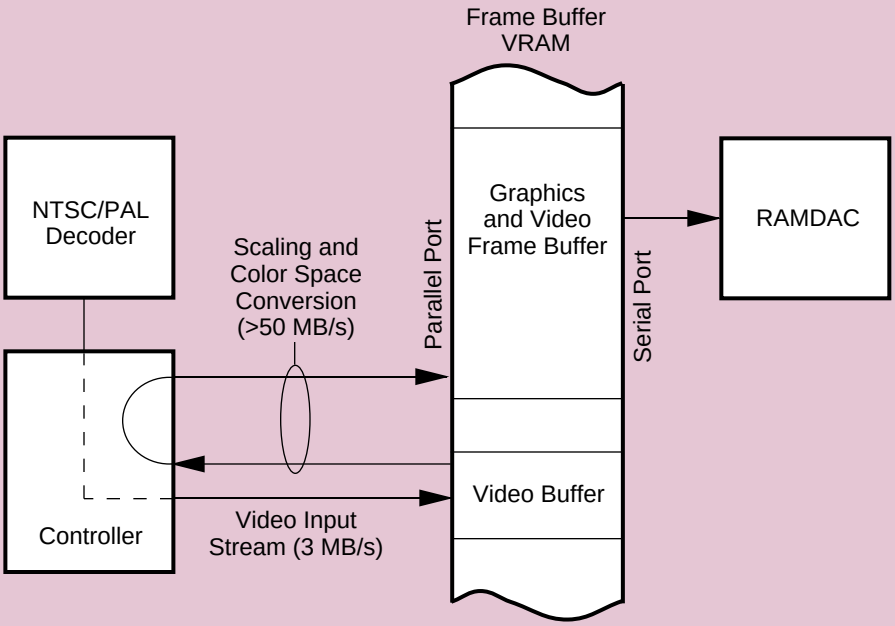


Figure 10. Traditional Method for Handling Live Video in the Frame Buffer

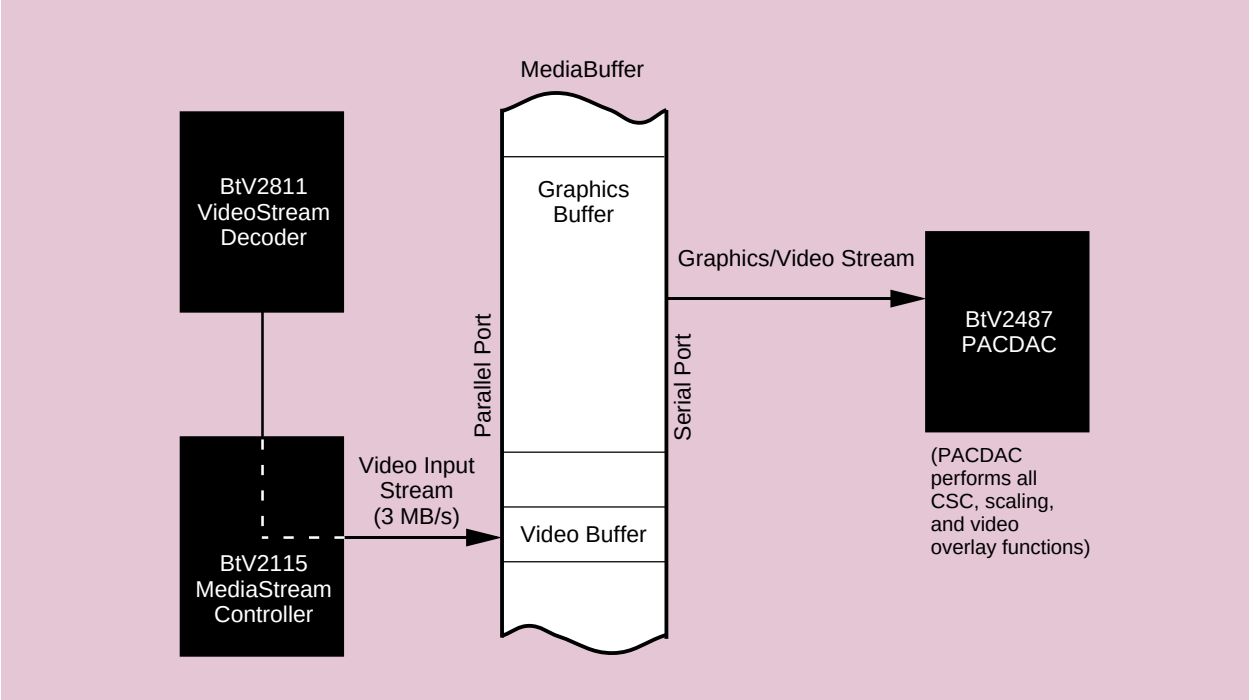


Figure 11. BtV MediaStream Family Method for Handling Live Video in the MediaBuffer

only the bandwidth necessary to fill the video buffer is consumed on the DRAM port of the MediaBuffer. For a CIF resolution video stream at 30 fps, this is only 4.6 MB/s. This results in approximately 95 MB/s of unused bandwidth available for other functions such as graphics and/or additional video windows.

Print-to-Video NTSC/PAL Output Option

The BtV MediaStream family provides a unique ability to encode AVI or other video file formats for presentation on an NTSC/PAL composite video output from the PACDAC. This option is ideal for recording video from a Video for Windows (VfW) file to a standard VCR or playing an AVI file on a TV monitor (Figure 12).

Composite video encoding is achieved using a combination of software and hardware that encodes each frame of a video file sequence into a composite NTSC or PAL waveform. The result is output through a Digital-to-Analog (DAC) converter on the BtV2487 for NTSC or PAL video output. The size and format of the encoded video is 160 x 120 pixels in 4:1:1 video format.

Window-to-Video NTSC/PAL Output Option

Another capability with the BtV MediaStream family is a window-to-video output option. This feature allows a selected screen element to be output on the composite output pin of the PACDAC at typically 2–3 updates per second (Figure 13). This feature is useful for recording to video tape or delivering presentations on TV monitors or projection systems.

At regular intervals, a background software task encodes the selected window into a composite video wave form which the PACDAC outputs in standard NTSC or PAL video format. Any rectangular area up to 640 x 480 pixels of the graphics frame buffer may be selected for encoding. Since the encoding is performed entirely by software, video quality scales with processor power and can be traded for update rates. For example, the quality of filtering functions, such as flicker filtering can be balanced with the desired video update rate for optimum use. With the addition of frame-accurate computer-controlled VCRs or writable disk recorders, extremely high-quality video animation sequences can be recorded.

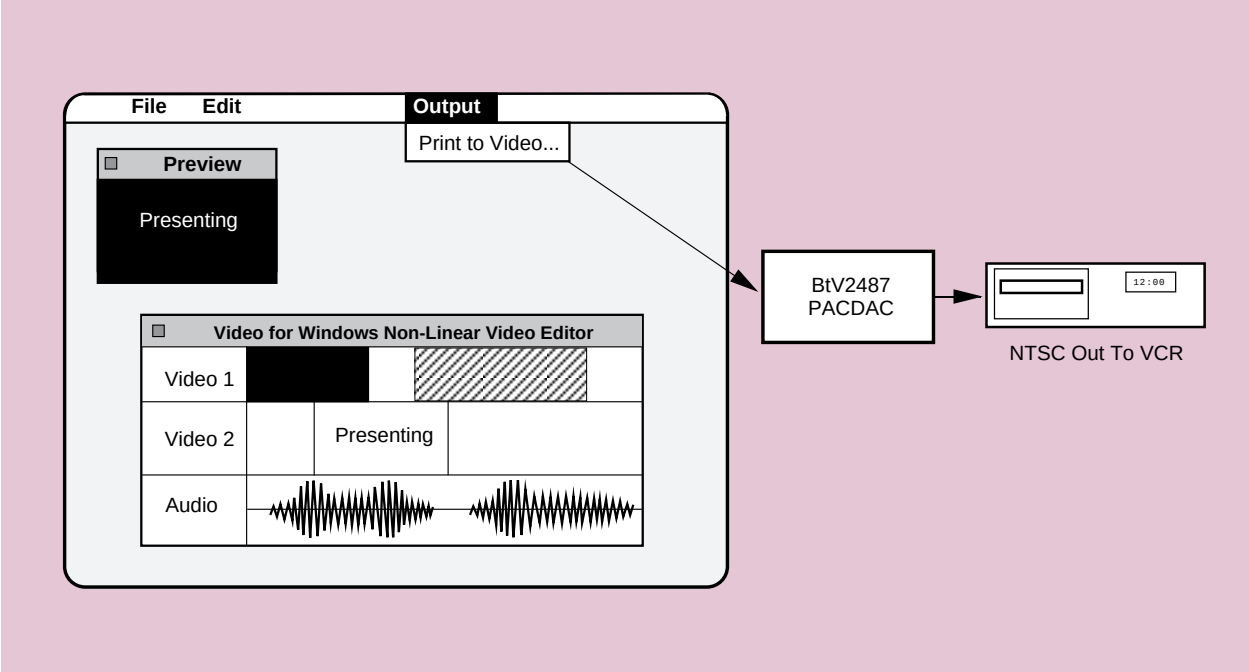


Figure 12.

Typical Print-to-Video

NTSC/PAL Encoding Example

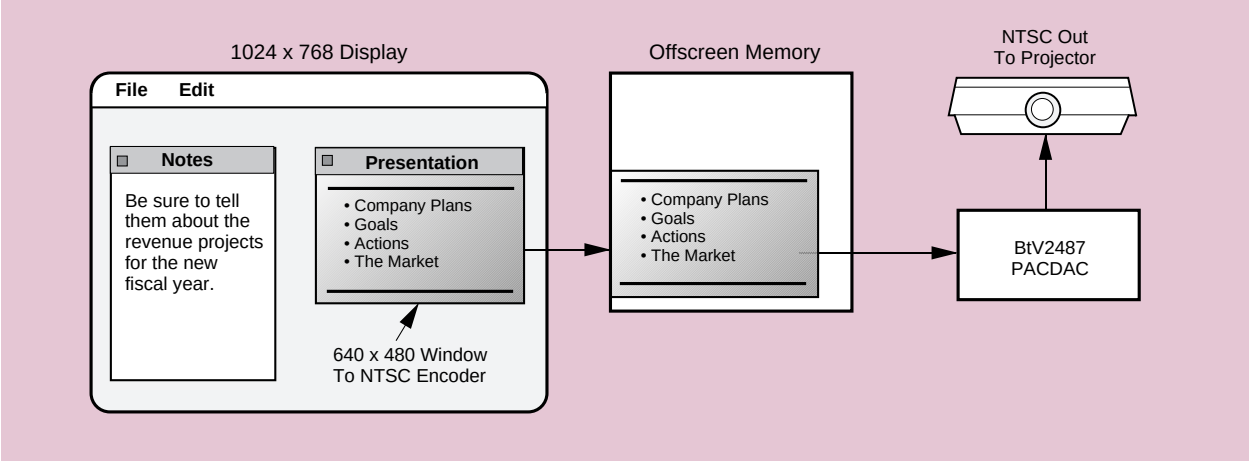


Figure 13.

Window-to-Video

NTSC/PAL Encoding

The MediaStream Controller, when used with the BtV2300 AudioStream Interface, provides a fully integrated graphics and audio subsystem. Thus, a single subsystem handles both the graphics and audio needs, utilizing a single bus connected subsystem to do so.

When used with the Yamaha FM synthesis chips (OPL2/3/4), the audio capabilities of the MediaStream family provide stereo audio compatible with Microsoft Windows Audio and popular DOS-based games. The basic audio subsystem is shown in Figure 14.

For DOS game applications that assume the presence of game audio ISA bus hardware, the BtV MediaStream family provides compatible emulation of the ISA hardware. This ensures compatibility with popular DOS game applications.

Features of the BtV MediaStream family audio solution include:

- Full stereo audio I/O capability at programmable sample rates through 48 K samples per second
- Simultaneous full duplex playback and record
- Simultaneous play of two WAV files. This allows simultaneous playing of system sounds and application sounds or the mixing of complex application sounds
- Full compliance with the audio portions of the MPC II specifications when used with Brooktree's comprehensive audio driver support.
- Local bus attachment and address decode for Yamaha FM synthesis chipset provided by the MediaStream Controller.

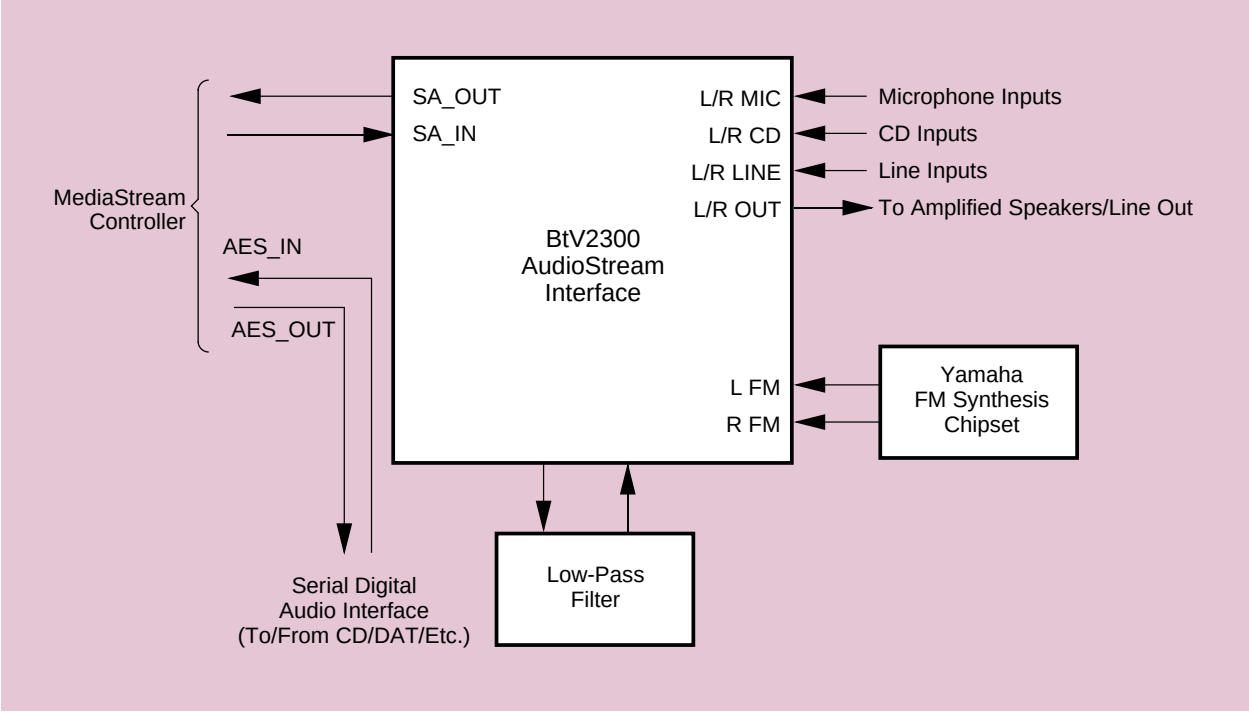


Figure 14. The BtV 2300 AudioStream Subsystem

- Caching of audio sound clips in the MediaBuffer allows high-speed burst access by the CPU resulting in:
  - reduced CPU overhead
  - increased application performance
  - looping on sound clips requires no processor intervention
- Compatibility with popular DOS games at the register level
- Audio VxD allows proper operation of multiple Windows 3.1 DOS sessions using audio services
- Analog inputs for microphone, compact disc (CD), and line level inputs
- Analog inputs for direct connection of Yamaha FM synthesis chipsets
- Serial AES/EBU connections to the BtV2115 MediaStream Controller
- Flexible on-chip mixing of all analog inputs
- On-chip preamplifier for direct microphone connections
- 8- and 16-bit compatible playback of windows.WAV files
- Stereo or mono operation
- Digital audio I/O via Serial AES/EBU connections to the BtV2115 MediaStream Controller
- Serial Digital Audio Interface compliant with the EIAJ CP-340 specification for digital connections to compact disc players, Digital Audio Tape (DAT) players, and other players that support this interface. Using external interface circuits, either a coaxial or fiber optic connection may be achieved.

Digital Mastering Capability

A unique feature of the BtV MediaStream family audio system is the ability to connect to digital audio components such as digital DAT decks, minidiscs, and CD audio players through an industry standard serial interface. This capability turns the PC into a powerful digital mastering workstation. Since capture, mixing, and effects are performed in the digital domain, results are obtained without introducing noise sources from conventional analog conversion processes. This capability is ideal for applications ranging from multimedia titling to professional audio mixing. To Microsoft Windows, the MediaStream family's digital audio interface appears just like another WAV device.

BtV's digital audio interface is achieved via two physical/electrical interfaces with the same data format:

- AES/EBU which is generally used on professional equipment and uses balanced 3-pin XLR connectors.
- Sony/Philips Digital Interchange Format (S/PDIF), also called AES consumer, which is primarily found on consumer-grade digital audio components. The S/PDIF interface utilizes either an unbalanced RCA analog or optical connection.

BtV WaveStream: Software Wavetable Synthesis

Brooktree is introducing WaveStream, a software-only, high-quality music synthesizer designed specifically for the PC multimedia environment.

WaveStream provides a software-only wavetable upgrade path for existing, lower-quality FM synthesis-based audio cards. By providing a software module, Brooktree has given multimedia systems a significant quality improvement without the need for expensive dedicated DSP hardware. WaveStream technology uses innovative techniques allowing the x86 platform to perform as a virtual DSP, thus providing high-quality music synthesis to existing multimedia platforms.

The WaveStream synthesizer is implemented as a Windows virtual device driver (VxD) base module, written in assembly code, and hand optimized for the 486 and Pentium class of personal computers. The engine, designed around a 16-bit sampled library, uses adaptive dynamic filtering for expressiveness, and high-quality interpolation techniques to provide 16-bit, stereo output. The engine supports the following real-time control processes: pitch bend, aftertouch, modulation wheel, sustain, velocity, dynamic filters, LFO, and Filter/Amplitude ADSR envelopes. The MIDI command parser, for the purpose of driving the synthesizer engine, is also written at the VxD level. The MIDI parser provides dynamic voice allocation and real-time dynamic MIDI control. Real-time scheduling for the synthesizer engine is provided by a VxD level kernel. A Dynamic Link Library (DLL) provides the interface between the Windows multimedia layer and the synthesizer. The DLL has the bare essentials to facilitate MIDI file playback and external MIDI controller play modes. The DLL also implements an instrument cache and management of active instruments used by the MIDI parser (Figure 15).

WaveStream Technical Concept

Wavetable synthesis, also known as sample-based playback, provides very high-quality music playback. The technology starts with a collection of digitally sampled sounds, called the instrument library. Each instrument within the library is created by digitally sampling multiple note ranges on actual instruments.

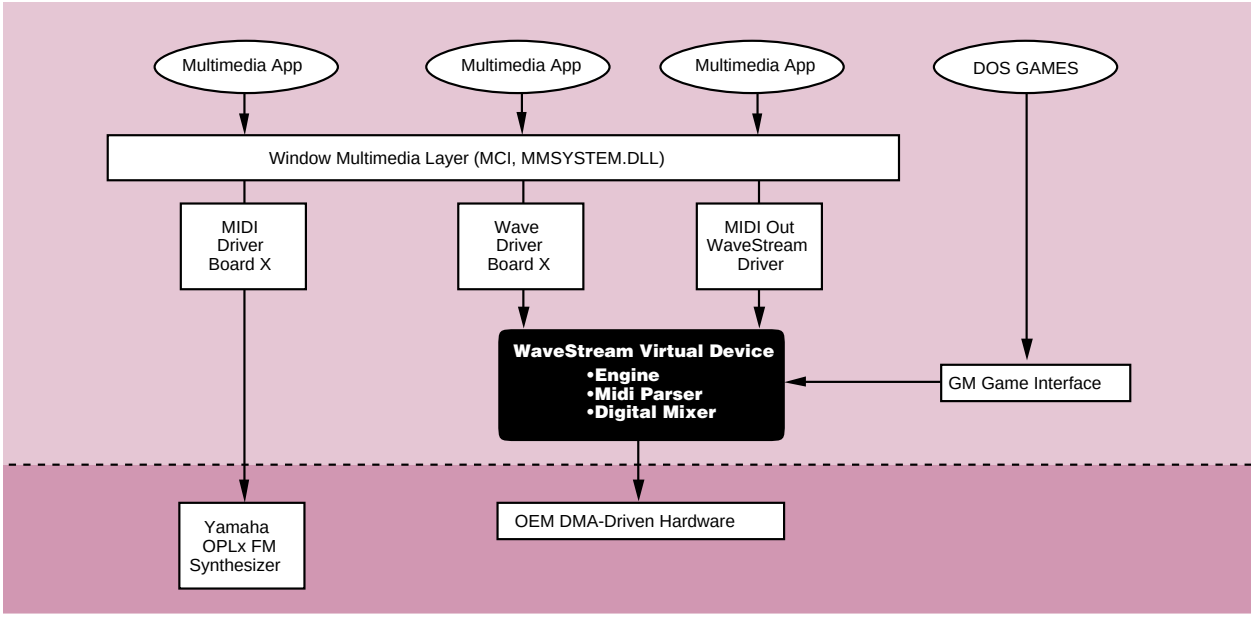


Figure 15. WaveStream Overview Diagram

When a wavetable synthesizer is called upon to play an instrument, it will search the library for the note range with the closest proximity on the musical scale. DSP algorithms are then performed to provide the necessary pitch shifting, filtering, interpolation, and signal conditioning to recreate the original instrument's timbre. The result is a much higher quality sound than that produced by outdated FM synthesis, since the method starts with digital samples of the original instruments rather than manipulating oscillators.

Neither real-time system performance nor high-end quality features such as dynamic timbre have been overlooked. Accurate real-time playback of MIDI files with expressive velocity tracking (adaptive filtering) recreates every nuance of musical performance. Host processor MIPS utilization is scalable via a DynaVoice on-demand Dynamic Voice Allocation mechanism which allocates voices according to preset system parameters which may be based on system configuration or selected by the user. Thus, the synthesizer is both system smart and user configurable.

WaveStream Unique Features

WaveStream offers several distinguishing features for a wavetable synthesis product, some unavailable even on higher priced hardware-based synthesizers. An 8 MB instrument sample set offers numerous individual sample points, allowing more precise non-sampled note interpolation. The larger sample set also provides more room for higher quality sample looping, creating a more realistic instrument replication. WaveStream's DynaVoice On-Demand Dynamic Voice Allocation loads and caches instruments only when called upon to do so by an application. This frees Windows system RAM for other uses while MIDI sequences are not required. WaveStream's unique MultiSynth hybrid mode allows user-definable, mixed Wavetable and FM synthesis, to free up additional CPU MIPS. External MIDI keyboard input is smooth and highly responsive. Users can dynamically adjust voice requirements for additional CPU processing availability. DOS games which function in a full or partial screen under Windows, and support the GM standard, benefit completely from the exceptional quality of the WaveStream MPU-401 emulation mode.

VESA DDC

The BtV MediaStream family provides full compliance with the VESA standards for Display Data Channel (DDC) specifications versions 1, 2a, and 2b.

DDC specification compliance is offered for:

Version 1: DDC control via two pins in the standard VGA connector.

Version 2a: DDC control via I^2C connection through two pins in the standard VGA connector.

Version 2b: DDC control via ACCESS.bus compatible connection through two pins in the standard VGA connector.

VESA DPMS

The BtV MediaStream family BIOS and drivers provide full compliance with VESA Display Power Management Signaling (DPMS) to meet Environmental Protection Agency (EPA) Energy Star (Green PC) requirements.

DCI

The Display Control Interface (DCI) specification was developed by Intel and Microsoft to allow code other than display drivers and the Windows GDI access to display hardware. The result of this specification is that specially written display drivers and installable software codecs can now have direct access to hardware features to accelerate video display, compression, and decompression. The BtV MediaStream family drivers provide DCI extensions that allow DCI-compliant codecs to efficiently take advantage of the MediaStream family's video acceleration capabilities.

ACCESS.bus

To reduce the multitude and variety of various connectors found on the rear panel of most PCs, ACCESS.bus was developed to provide a single daisy-chained interconnect among low-speed peripherals such as mice, modems, and printers. As many as 125 devices can be linked over a distance of eight meters using ACCESS.bus.

ACCESS.bus is a combination of an I^2C interface with the appropriate protocols to handle the communications between host-based drivers and individually addressable peripherals.

When connected through a DDC 2b compliant monitor, ACCESS.bus connection to the monitor and additional peripherals is through the VGA connector. If a DDC 2b monitor is not connected, ACCESS.bus connections are accomplished through the BtV MediaStream family A/V breakout adapter.

ACCESS.bus provides a convenient method for controlling consumer products such as tuners and providing infrared remote capabilities to the PC.

I^2C

The inter-IC bus (I^2C) was originally developed by Philips Semiconductors to facilitate the communications and control among ICs in consumer electronics. Brooktree utilizes this standard for two purposes: to facilitate communications between the MediaStream Controller and the PACDAC and VideoStream Decoder, and to provide ACCESS.bus capability. Comprising of a two-line serial interface, I^2C provides the physical layer (signaling) protocol of the ACCESS.bus standard.

VESA VL Bus

The BtV MediaStream family complies with the interface standards as defined by the VESA standard for the PC local bus. BtV MediaStream family provides compliance through version 2.0 of this specification.

PCI Bus

The BtV MediaStream family complies with the version 2.0 interface standards as defined by the PCI Special Interest Group for the Intel PCI bus.

AES/EBU

The AES/EBU standard (also defined under ANSI S4.40-1985 and EIJ CP-340) defines a serial transmission format for digital audio data. The Sony/Philips Digital Interchange Format (S/PDIF) is based upon the AES/EBU standards and is used in consumer-grade audio components. The BtV MediaStream family utilizes a superset of this standard to facilitate the communications of digital audio data to and from the BtV MediaStream family audio subsystem. Using this interface allows both copper and fiber connection to digital audio gear for playback or recording of digital audio from the BtV MediaStream family system.

Plug and Play

To meet the needs of today's multimedia PCs, systems must allow for hassle-free installation of devices with self-configuring software and hardware. In 1993, Microsoft kicked off the Plug and Play (PnP) initiative with this objective. Although originally targeted for the ISA bus, PnP is an integral part of the PCI bus specification. Microsoft has set the requirement that hardware and software must meet PnP standards to maintain the right to carry compatibility logos for Windows 95.

Brooktree has incorporated PnP conformance into the BtV MediaStream family of chips, BIOS, and software drivers. The result is that OEMs can be assured of meeting the requirements as specified by the PnP standards.

The BtV MediaStream family supports PnP with the following features:

- Fully compliant with PCI 2.0 specifications for plug and play
- ACCESS.bus support for external peripheral devices
- Audio subsystem provides both the required and recommended configurations for PnP
- Support for VESA DDC 1/2b monitors including DPMS
- Support for VESA BIOS Extensions for DDC

Total Solutions Mean Total Support

The BtV MediaStream family is more than a collection of state-of-the art IC devices. The BtV MediaStream product family comprises a complete catalog of support products and tools. From software drivers and utilities to complete evaluation hardware — Brooktree is committed to providing you with the best support available in the industry today.

The BtV MediaStream family support catalog includes:

- A comprehensive menu of software drivers, utilities, and mini applications
- Complete evaluation kits, software development kits, and manufacturing design kits for both VL-bus and PCI bus configurations
- On-line support and download access to latest drivers via Brooktree's support BBS

Brooktree provides an extensive suite of software support products including:

- Display Drivers
- Windows MCI Drivers
- ACCESS.bus Drivers
- Installable video codec interfaces
- VGA BIOS
- VESA BIOS Extensions (VBE)
- User and OEM utilities
- Mini Utility Applications
- Diagnostics

Display Drivers

The BtV MediaStream family video software drivers are extensively tested and run through a quality assurance flow to ensure that the drivers meet the quality standards of high-volume OEMs and extract the highest performance from the BtV MediaStream family hardware.

Brooktree display driver support is shown in Table 4.

Operating Environment	Supported Pixel Formats	Supported Pixel Depths (bits/pixel)
Microsoft Windows 3.1	640 x 480 800 x 600 1024 x 768 1280 x 1024	4,8,16,24,32 4,8,16,24,32 4,8,16,24 4,8,16
Microsoft Windows 95	640 x 480 800 x 600 1024 x 768 1280 x 1024	4,8,16,24,32 4,8,16,24,32 4,8,16,24 4,8,16
Microsoft Windows NT	640 x 480 800 x 600 1024 x 768 1280 x 1024	4,8,16,24,32 4,8,16,24,32 4,8,16,24 4,8,16
IBM OS/2 v2.2	640 x 480 800 x 600 1024 x 768 1280 x 1024	8,16 8,16 8,16 8,16
AutoCAD v11, v12 Autoshade v2.0	640 x 480 800 x 600 1024 x 768 1280 x 1024	8,16 8,16 8,16 8,16

Table 4. BtV Display Driver Library

Windows MCI

Under Windows 3.1 and 95, the Media Control Interface provides applications with a scripting language interface to audio and video devices. Brooktree provides the necessary drivers that allow MCI-compatible interfaces to MediaStream family hardware.

Video Codecs

Video coders/decoders provide software-based compression and decompression of full motion video sequences from/to disk. Brooktree drivers provide full Display Control Interface (DCI) compatibility within BtV MediaStream family associated drivers. This allows any DCI-compliant codec to be fully accelerated by the BtV DCI provider including MPEG-1 and TrueMotion–S video decompression algorithms.

ACCESS.bus

Brooktree provides a general ACCESS.bus interface for developers providing support for additional peripherals.

BIOS

Brooktree provides a VGA-compatible BIOS with the following features:

- Both VESA VL-bus and PCI bus support
- VESA compliant BIOS extensions (VBE)
- Support for VESA DPMS (display power-management signaling)
- Full VESA DDC 1, 2a, and 2b compliance
- Full PCI Plug and Play compliance
- OEM BIOS customization package

Utilities

For ease in integrating BtV MediaStream family-based systems into OEM products, Brooktree provides software utilities which aid installation of the appropriate drivers, test utilities for manufacturing and field diagnostics. Included are:

- Driver installation utilities for Microsoft Windows, NT, and OS/2
- DOS video mode configuration utility
- Windows video mode configuration utility
- OS/2 video mode configuration utility

MiniApps

Several Windows-based mini-applications are provided which exercise the multimedia capabilities of the BtV MediaStream family hardware. Included as MiniApps are:

- Print-to-video applet that exercises the print-to-video features of BtV MediaStream family
- Audio control panel applet that provides user control of the audio features of BtV MediaStream family including playing WAV files to the digital audio interface
- CD player that provides user control of an audio CD in the system's CD ROM drive and allows disc title and tracks to be saved for each disc
- Mini recorder allows record and playback of all audio formats supported by the BtV MediaStream Family

WaveStream

Brooktree provides a software-only wavetable synthesizer to replace outdated FM synthesis. This unique software algorithm is general MIDI compliant, it has up to 32 voice polyphony, it emulates MPU-401 for DOS games support in Windows and it is optimized for minimum CPU overhead.

Unlike expensive wavetable synthesis boards with a maximum 2 MB instrument sample set, BtV WaveStream offers 8 MB/s of crystal clear instrument samples, all stored on the hard disk drive.

MPEG

For high-quality video playback applications, Brooktree offers the Mediamatics Arcade™ Player MPEG–1 software decoder. Using the video acceleration features of BtV MediaStream allows this software codec to achieve high frame rates and high video quality on 486 and Pentium® class machines.

Created as evaluation packages, programmers aids, and reference designs for the OEM, Brooktree offers several kits that demonstrate a complete multimedia (graphics, audio, and video) solution on one board.

BtV2100EVK

The BtV2100EVK is available as either a VL-bus PC card or a PCI bus card. Figure 16 shows the PCI Version. Both kits contain user guides and installation disks for complete evaluation of the BtV MediaStream family. The add-in boards feature:

- High-performance graphics with 1 or 2 MB VRAM
- Accelerated video playback
- Stereo audio input and output
- Audio amplifiers for direct headphone connection
- S/PDIF (AES Consumer) digital stereo DAT and minidisc input and output
- SVHS component and composite video input for video capture and display
- Print-to-video and window-to-video composite video output
- ACCESS.bus attachment
- Utilizes unique BtV MediaStream family A/V breakout adapter

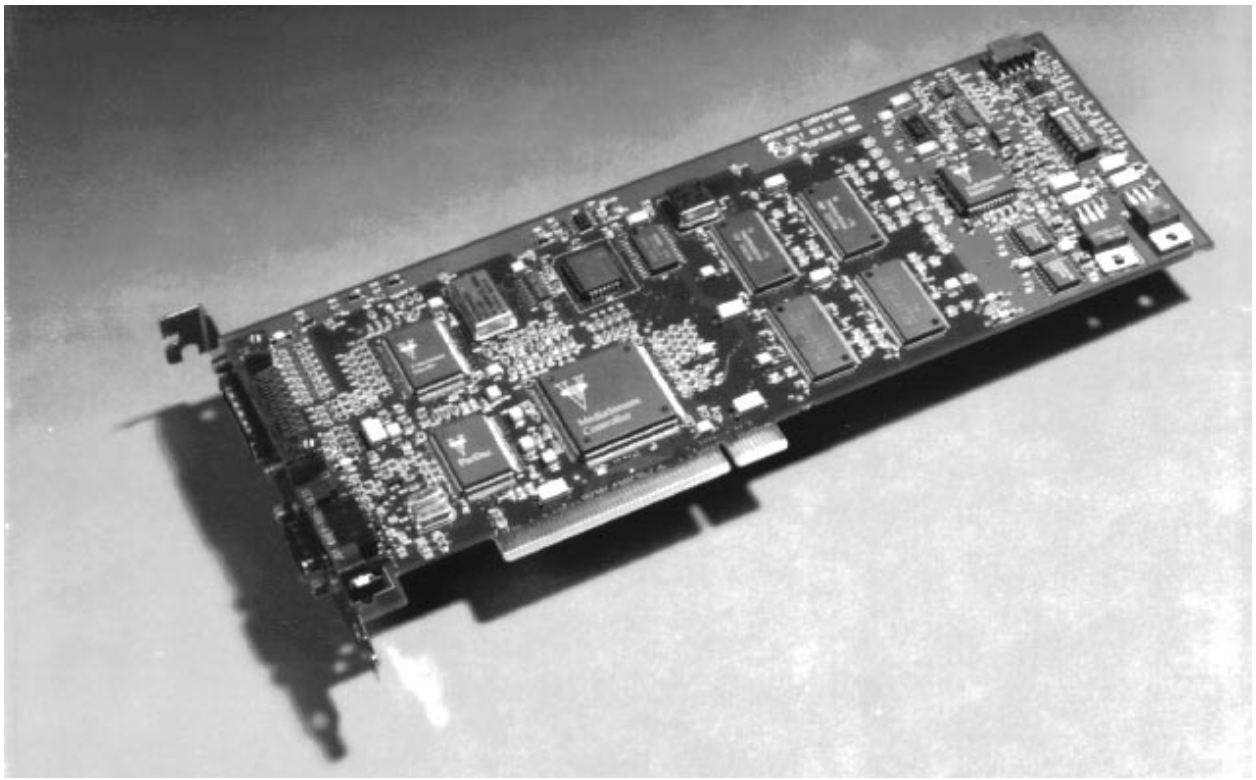
BtV2100MDK

The BtV2100MDK is a complete manufacturing design kit that contains:

- Theory of operation application note for both the VL and PCI versions of the BtV2100EVK
- Schematics, in both paper and computer media formats
- User guide in computer media format
- Gerber files for PCB film
- Diagnostics

The MDK is designed for OEMs who wish to utilize the EVK designs as either a starting point or as a turn-key design to get quickly into production.

Figure 16. The BtV2100EVK is available as either a VL-bus card or a PCI bus card.



A/V Breakout Adapter

Because the PC AT feature card is limited in the number and type of connectors that can be placed on the expansion board bracket, Brooktree has designed a breakout adapter that provides an external carrier of the various connectors needed for the audio and video features of the BtV MediaStream family. (See Figures 17 and 18.)

Connection between the EVK card and the breakout adapter is via a 36-pin 3 M D-shell connector.

The connectors on the EVK card and the breakout adapter are shown in Tables 5a and 5b, respectively.

Brooktree makes available the mechanical and electrical drawings of this breakout adapter to OEMs who wish to turnkey this design for their own use.

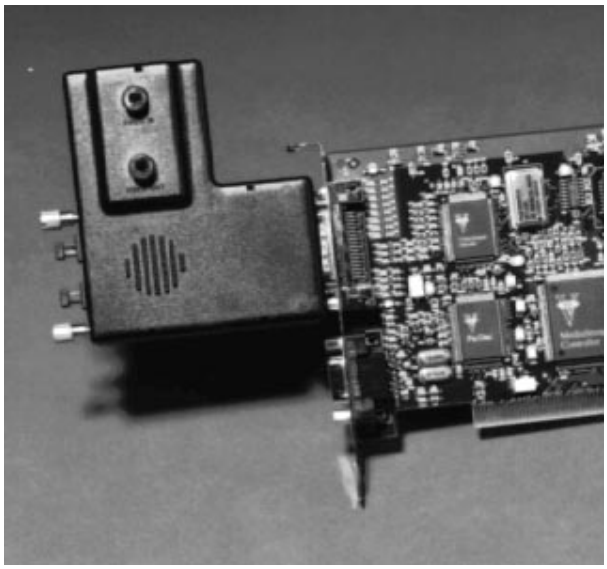


Figure 17. BtV MediaStream Family's unique breakout adapter shown connected to the BtV2100EVK PCI card.

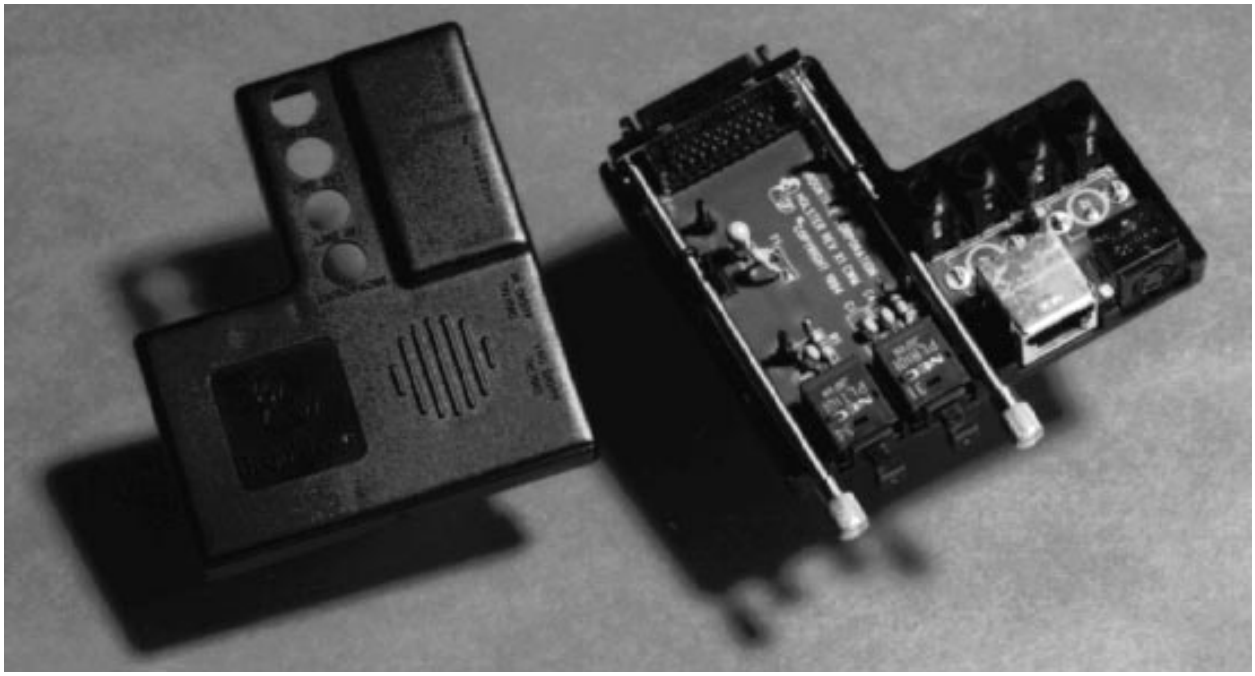


Figure 18. The A/V breakout adapter provides an external carrier of the connectors needed for the audio and video features.

I/O Function	Connector
Monitor Connection (RGB)	DB-15 Male
A/V Breakout Adapter I/O	36-pin D Shell

Table 5a. BtV MediaStream Family EVK Card Connectors

I/O Function	Connector
Composite Video In	Female Phono
NTSC/PAL Out	Female Phono
Microphone In	3.5 mm jack
Headphones Out	3.5 mm jack
Line in	3.5 mm jack
Line out	3.5 mm jack
SVHS input	4-pin DIN
ACCESS.bus	4-pin modular
Fiber optic digital audio I/O	TOSLINK

Table 5b. Audio/Video Breakout Adapter Connectors.

Advance Information

This document contains information on a product under development. The parametric information contains target parameters that are subject to change.

BtV2115

MediaStream Controller

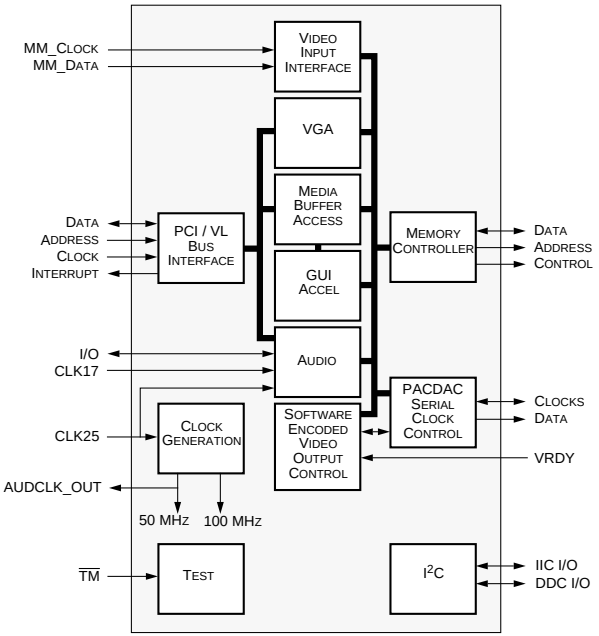
Applications

- Microsoft Windows™ 3.1, Win '95™, and NT™ GUI acceleration
- IBM OS/2™ GUI acceleration
- Xwindow System™ acceleration
- Video for Windows™ and Microsoft Windows MPC Audio™
- High Resolution Color Graphics
- Video-conferencing
- Multimedia Applications
- Video Playback Acceleration

Related Products

- BtV2487 PACDAC
- BtV2811 VideoStream Decoder
- BtV2300 AudioStream Interface

Functional Block Diagram

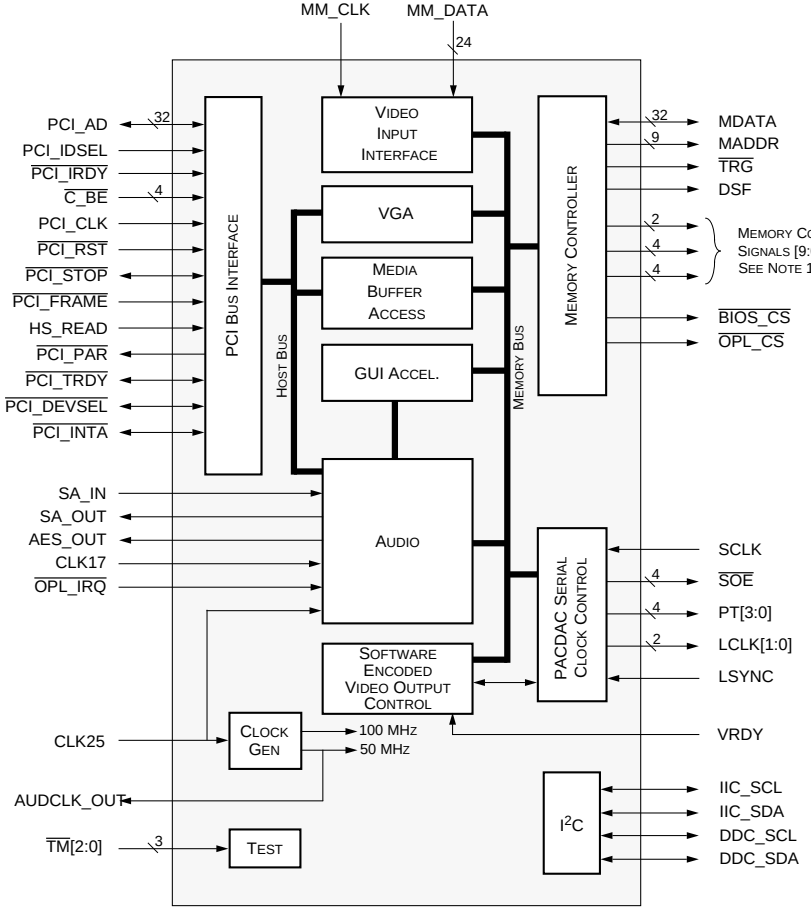


Distinguishing Features

- Local Bus Graphics Controller (glueless for):
  - PCI 2.0 bus
  - VESA VL 2.0 bus (32 bit)
- 32 bit VRAM (1MB to 4MB)
  - Samsung™ 256Kx8: -8,-7,-6 128Kx16:-8,-7,-6
  - Texas Instruments™ 256Kx16:-8,-7,-6
  - NEC™, Toshiba™, IBM™ 256Kx16:-8,-7,-6
- Up to 1MB of Flash ROM
- Supports Yamaha OPL2,3,4
- Resolutions:
  - 640x480: 4, 8, 16, 24, 32 b/pixel up to 76 Hz
  - 800x600: 4, 8, 16, 32 b/pixel up to 76 Hz
  - 1024x768: 4, 8, 16, 24 b/pixel up to 75 Hz
  - 1280x1024: 4, 8, 16 b/pixel up to 75 Hz
  - 1600x1280 interlaced: 4, 8 b/pixel 45/90 Hz
- VGA compatibility for modes 0x00 - 0x07 and 0x0D - 0x13
- Multimedia Solution
  - Glueless connectionBtV2811 VideoStream Decoder
  - Acceleration of two video planes with hardware double buffering
  - Hardware-accelerated video playback
  - Stereo audio in/out
  - Software encoded NTSC/PAL video out to VCR
  - MPEG raster-block assist
  - Stretch Blt and raster scaling
  - Legacy AudioPro™ compatibility
  - Digital Interface to consumer digital audio tape, minidisc, etc.
- Standard Interfaces
  - PCI bus 2.0 compliant
  - VESA VL bus 2.0
  - AES/EBU S/PDIF CP-340 (with full access to channel/user bits)
  - I^2C/ ACCESS.bus
  - VESA DDC1, DDC2A/B
  - VESA DPMS
- 208 pin Power Quad package

Brooktree® | *Brooktree Corporation • 9868 Scranton Road • San Diego, CA 92121-3707 • 619-452-7580*
1-800-2-BT-APPS • FAX: 619-452-1249 • Internet: apps@brooktree.com • L211501 Rev. C

Figure 3. BtV2115 PCI-Bus Block Diagram



Note 1. Refer to Table 2 on page 17, column “VRAM Interface Pins” for details on the RAS, WE, and CAS memory control pins.

Advance Information

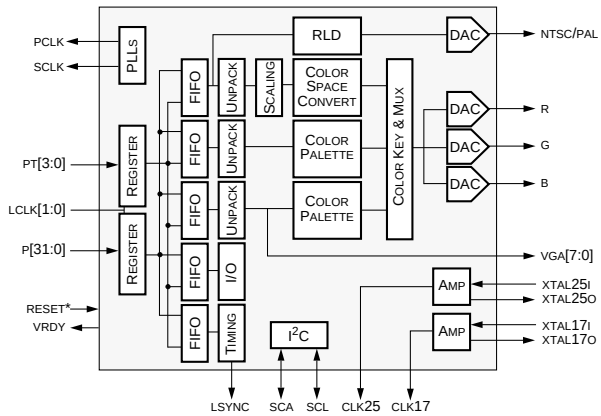
This document contains information on a product under development. The parametric information contains target parameters that are subject to change.

BtV2487

PACDAC™ Packetized Data DAC

The BtV2487 Packetized Data DAC (PACDAC™) when used in conjunction with the BtV2115 MediaStream Controller, provides a fully integrated graphics and video subsystem, specifically targeted at multimedia applications. The MediaBuffer (BtV multimedia sub-system memory) sits in between the BtV MediaStream Controller and the PACDAC. To maximize storage efficiency and bandwidth between the MediaBuffer and the PACDAC, the MediaStream family incorporates the MediaPacket Architecture, a patented technique for managing the flow of graphics, video, cursor and control to the PACDAC. This unique architecture incorporates packet-style data flow from the MediaBuffer to the PACDAC such that graphics and video can utilize the entire serial bandwidth available from the MediaBuffer. Normally during horizontal and vertical blanking, the serial port is not providing serial data to the DAC and is inactive. This inactive time can represent up to 30% of the total horizontal line time. To take advantage of this time, the PACDAC contains internal FIFO's that can be filled during this inactive time. Furthermore, color space conversion bilinear interpolative scaling filters on the PACDAC reduce CPU software overhead and minimizes both the MediaBuffer Storage and bandwidth requirements. This results in video playback capabilities beyond that which could otherwise be done as a result of increased effective bandwidth between the MediaBuffer and the PACDAC.

Functional Block Diagram



Distinguishing Features

- Bilinear Interpolative Scaling for Video
- YCrCb to RGB Color Space Conversion
- 1024x768x8 Graphics and 1024x768x24 30 fps Video in 1 MB of Memory
- Embedded Chroma/Color Keying for games development and virtual reality apps
- Two full screen, 30 fps Video Windows, Playback or Live
- NTSC/PAL Output Capability
- 4:2:2, 4:1:1 YCrCb or RGB 15,16,24-bit Video Support
- PLL Pixel and Serial Clock Generation
- 135 Mhz Operation
- Multiple Pixel Depths Supported, 4-bits to 32-bits per pixel
- True Color Cursor Support
- Asynchronous, Packetized Data Input Port
- VGA Output Port

Related Products

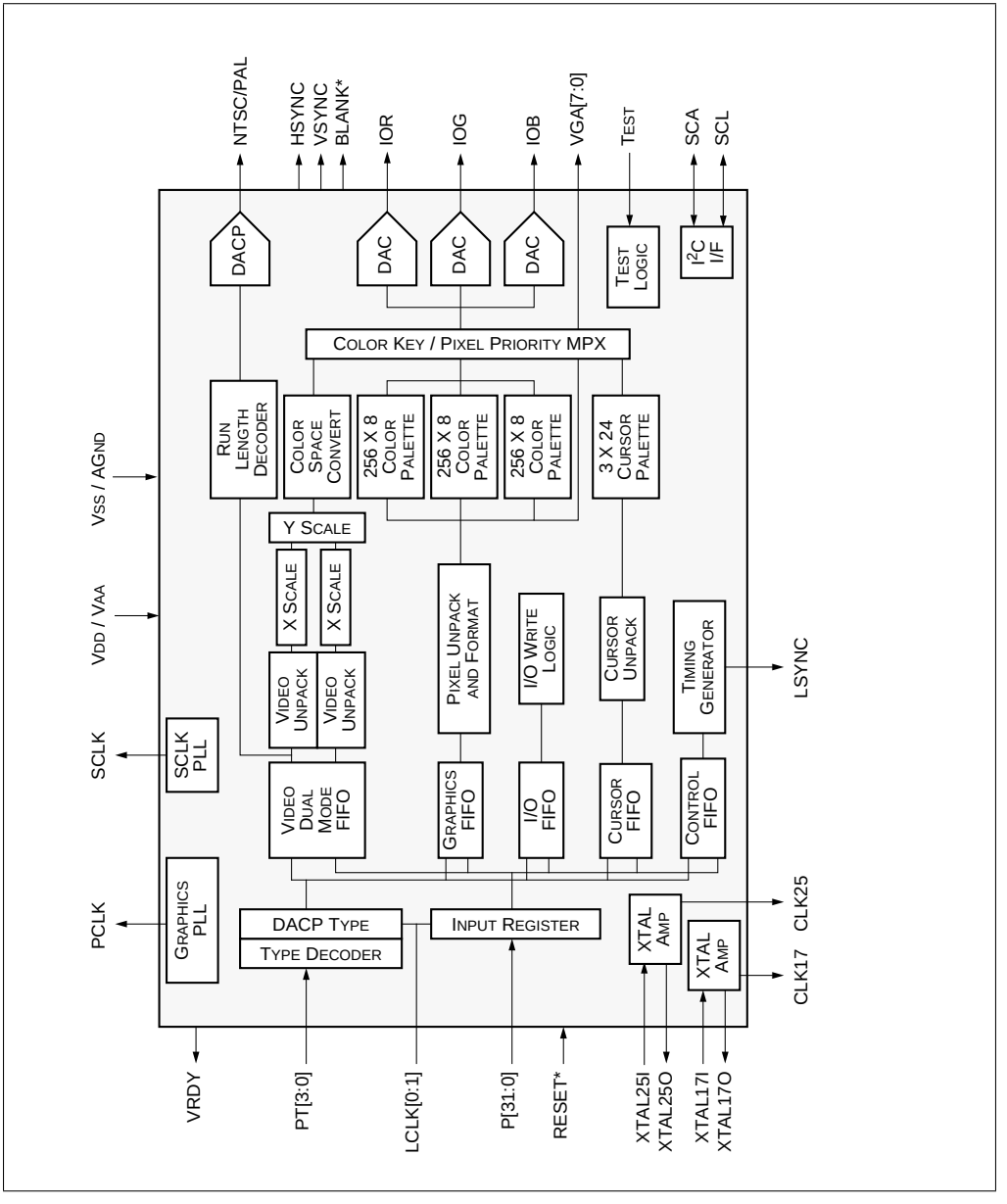
- BtV2115 – MediaStream Controller
- BtV2811 – VideoStream Decoder
- BtV2300 – AudioStream Interface

Applications

- Video for Windows
- Video Printing
- High Resolution Color Graphics
- Videoconferencing Display Systems
- Multimedia Applications
- Video Decompression Acceleration

Brooktree® | *Brooktree Corporation • 9868 Scranton Road • San Diego, CA 92121-3707 • 619-452-7580*
1-800-2-BT-APPS • FAX: 619-452-1249 • Internet: apps@brooktree.com • L248701 Rev. C

Figure 2. BtV2487 Detailed Block Diagram



Advance Information

This document contains information on a product under development. The parametric information contains target parameters that are subject to change.

BtV2300

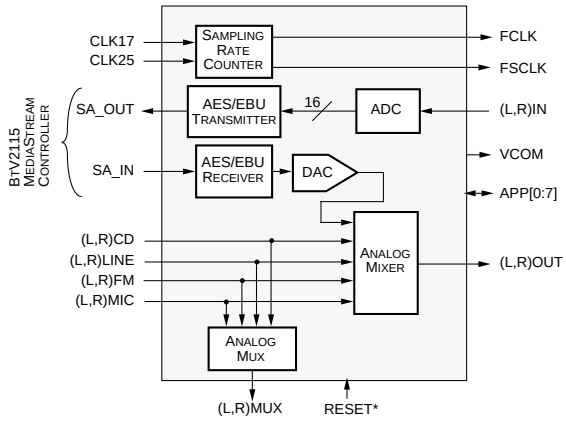
AudioStream Interface

A multimedia solution would not be complete without one important ingredient -- audio.

The BtV MediaStream family provides a solution that tightly couples the audio system to the video and graphics system. The BtV2300 AudioStream Interface when used with the MediaStream Controller, provides a fully integrated audio subsystem, specifically targeted at multimedia applications.

In the MediaStream family, access to the audio subsystem is accomplished by way of the controller's attachment to the high speed VESA local bus or PCI bus. Combining this high speed bus connection with the ability to transfer bursts of audio data to and from the MediaBuffer results in reduced CPU workload and a more efficient use of bus resources.

Functional Block Diagram



Distinguishing Features

- Sample Rates of 4–48 kHz
- Internal Stereo DACs & ADCs
- DOS Game Audio Support
- Analog Inputs for MIC, CD and Line Level Inputs
- Analog Inputs for Direct Connection to Yamaha FM Synthesis Chipset (OPL2/3/4)
- Flexible On-chip Mixing of All Analog Inputs.
- On-chip Pre-amplifier for Direct Microphone Connections
- Stereo or Mono Operation
- Playback of All Windows .WAV Files
- Serial AES/EBU Connections to the BtV2115 MediaStream Controller
- +5V Monolithic CMOS
- 44-pin PLCC Package

Related Products

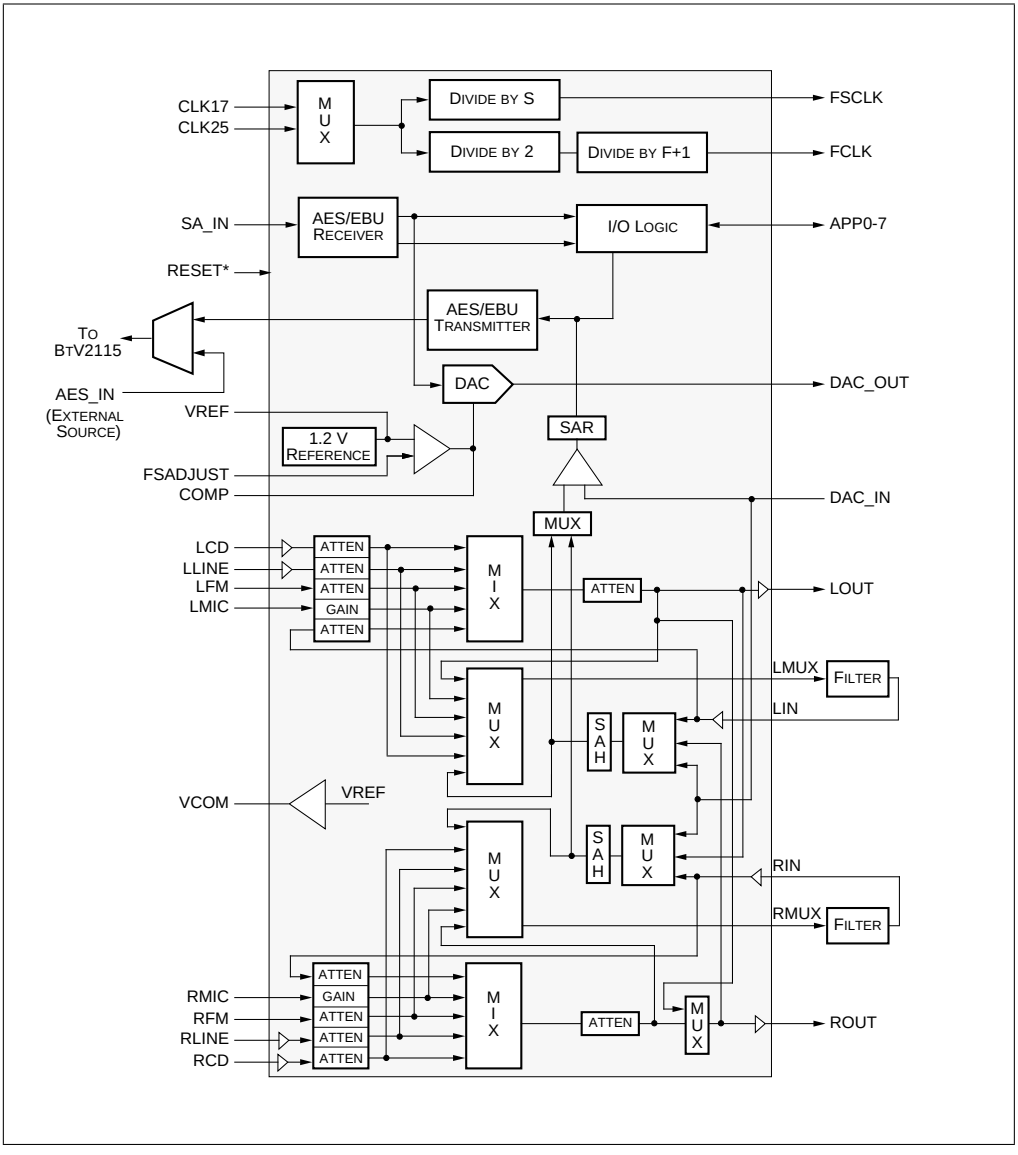
- BtV2115 MediaStream Controller
- BtV2487 PACDAC™

Applications

- Personal Computers
- Video Teleconferencing
- Multimedia Applications
- Digital Audio Workstations

Brooktree® | *Brooktree Corporation • 9868 Scranton Road • San Diego, CA 92121-3707 • 619-452-7580*
1-800-2-BT-APPS • FAX: 619-452-1249 • Internet: apps@brooktree.com • L230001 Rev. C

Figure 2. BtV2300 Detailed Block Diagram



Advance Information

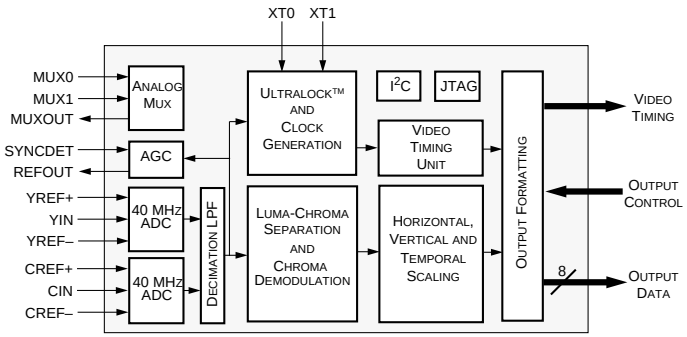
This document contains information on a product under development. The parametric information contains target parameters that are subject to change.

BtV2811

VideoStream Decoder

The BtV2811 is a single-chip, NTSC/PAL, composite and S-video decoder and scaler. Its low operating power consumption and power-down capability make it an ideal low-cost solution for PC video capture applications on both desktop and portable system platforms. BtV2811 supports square pixel and CCIR601 resolutions for both NTSC and PAL.

Functional Block Diagram



Distinguishing Features

- Single-Chip Composite/S-Video NTSC/PAL to YCrCb Digitizer
- On-Chip Ultralock™
- Square Pixel and CCIR601 Resolution for NTSC and PAL
- Chroma Comb Filtering
- Arbitrary Horizontal Scaling and Vertical Scaling (using line store)
- Arbitrary Temporal Decimation for a Reduced Frame-Rate Video Sequence
- Programmable Hue, Brightness, Saturation, and Contrast
- User-Programmable Cropping of the Video Window
- 2x Oversampling to Simplify External Analog Filtering
- Two-Wire I²C Bus Interface
- YCrCb (4:2:2) Output Format
- Software Selectable Two-Input Analog Mux
- Auto NTSC/PAL Format Detect
- Automatic Gain Control
- IEEE 1149.1 (JTAG) Interface
- 100-Pin PQFP Package

Related Products

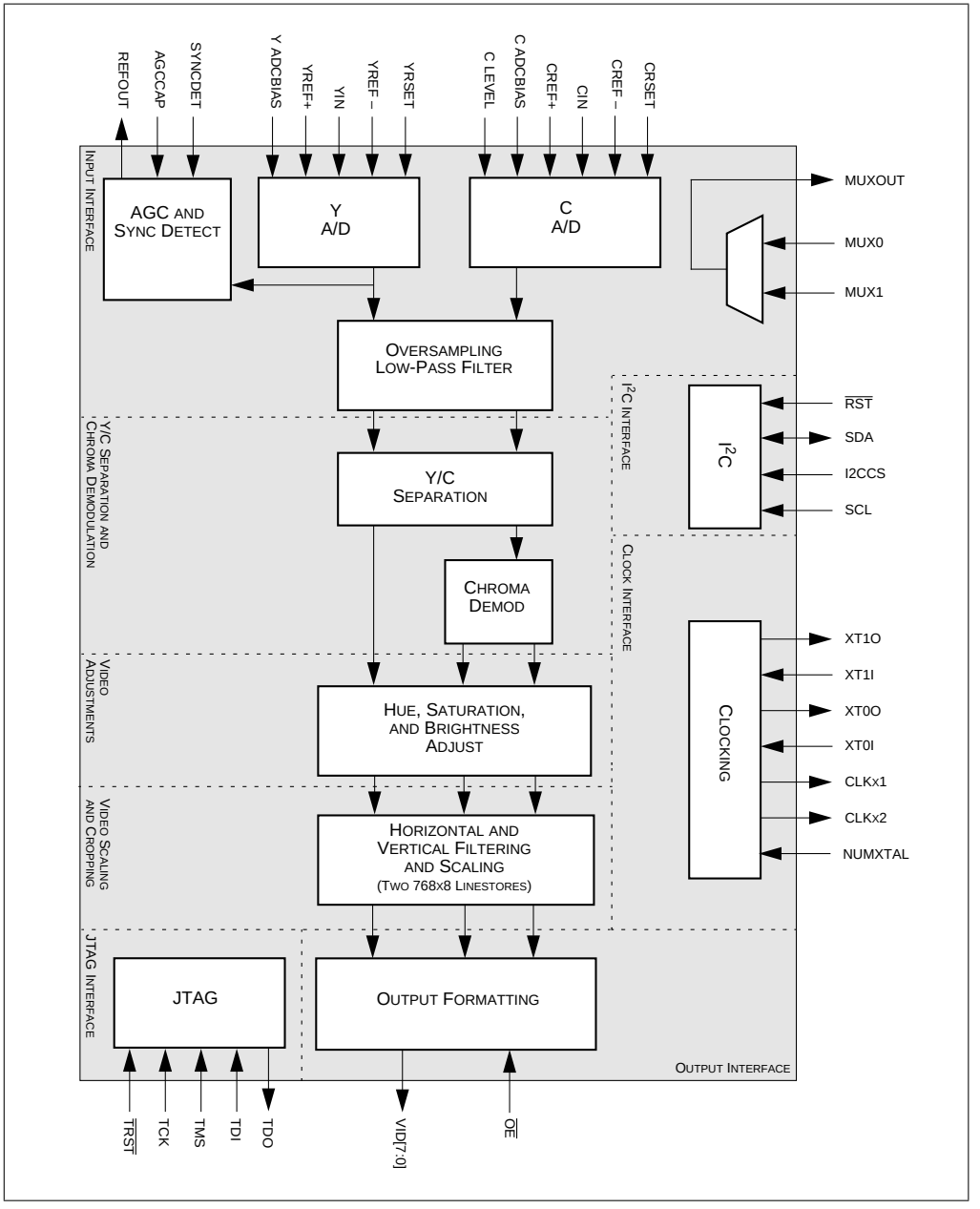
- BtV2115, BtV2487
- Bt812, Bt858, Bt855, Bt856, Bt857
- Bt851, Bt885, Bt895

Applications

- Multimedia
- Image Processing
- Desktop Video
- Video Phone
- Teleconferencing
- Interactive Video

Brooktree® | *Brooktree Corporation • 9868 Scranton Road • San Diego, CA 92121-3707 • 619-452-7580*
1-800-2-BT-APPS • FAX: 619-452-1249 • Internet: apps@brooktree.com • L281101 Rev. C

Figure 1. BtV2811 Detailed Block Diagram



BtV MediaStream Family Components		
Part Number	**Description**	**Package**
BtV2115KPF	MediaStream Controller, VLB and PCI	208 Power QFP
BtV2487CHF135	PACDAC, 135 MHz with NTSC/PAL output	100 MQFP
BtV2300KPF	AudioStream Interface	44 PLCC
BtV2811KPJ	VideoStream Decoder	100 PQFP
BtV WaveStream	Software Wavetable Synthesis	NA
BtV MPEG	Software MPEG Playback Algorithm: Mediamatics MPEG Arcade™ Player	NA

BtV MediaStream Family Kits	
Part Number	**Description**
BtV2100EVK/V	VESA VL-Bus BtV MediaStream Evaluation Kit
BtV2100EVK/P	PCI Bus BtV MediaStream Evaluation Kit
BtV2100MDK	BtV MediaStream Manufacturing Design Kit

Brooktree®

Brooktree Corporation
9868 Scranton Road
San Diego, CA, 92121-3707
(619) 452-7580
1 (800) 2-BT-APPS
Fax: (619) 452-1249
Internet: apps@brooktree.com
BtVPG002–04/95