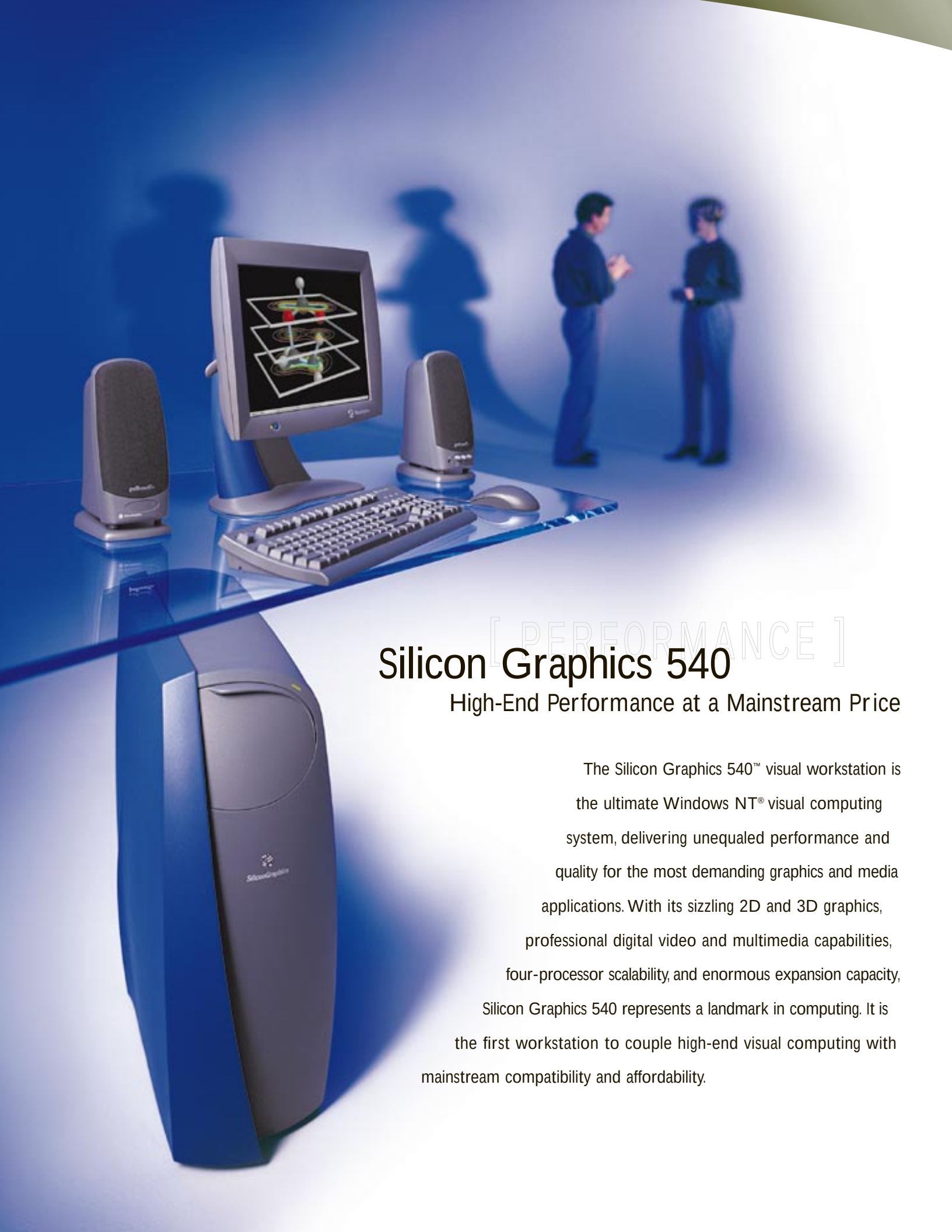
SiliconGraphics
Computer Systems

# Silicon Graphics 540™

## Visual Workstation

Product Guide



[ PERFORMANCE ]

# Silicon Graphics 540

## High-End Performance at a Mainstream Price

The Silicon Graphics 540™ visual workstation is the ultimate Windows NT® visual computing system, delivering unequaled performance and quality for the most demanding graphics and media applications. With its sizzling 2D and 3D graphics, professional digital video and multimedia capabilities, four-processor scalability, and enormous expansion capacity, Silicon Graphics 540 represents a landmark in computing. It is the first workstation to couple high-end visual computing with mainstream compatibility and affordability.

**Breakthrough Technology and Breakthrough Performance**

The Silicon Graphics 540 visual workstation gets its extraordinary capabilities from a new-generation computing architecture, light-years ahead of other Windows NT workstations. These PC-architecture systems, with their slow buses and need to support legacy protocols, lack the resources needed for leading-edge visual tasks such as advanced 3D modeling, complex image processing, and professional video editing. They're missing the accelerated 2D and 3D graphics processing, the enormous throughput, and the massive graphics memory that those jobs require. Attempts to get around such limitations through add-on cards such as graphics accelerators and video capture cards, and through buses such as AGP, yield only modest gains. All processing is still funneled through the same antiquated PC architecture, with its many built-in bottlenecks.

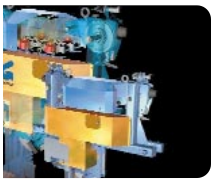
In response, Silicon Graphics wiped the slate clean by designing a Windows NT workstation from the ground up, creating a 21st-century architecture free from the limitations of the past. The Integrated Visual Computing (IVC) architecture provides a tightly integrated combination of high-speed graphics acceleration, high-speed interconnects, and scalable graphics memory that allows for truly astonishing performance. The IVC architecture also integrates sophisticated video, CD-quality audio, high-speed networking, and fast, high-capacity disk drives, making Silicon Graphics 540 a complete high-end multimedia system. In fact, the architectural innovation is visually extended by integrating support for the revolutionary Silicon Graphics 1600SW™ digital flat panel monitor. This combination of leading technologies sets a new standard for visual computing solutions.

Equally remarkable, Silicon Graphics 540 provides these next-generation technologies without sacrificing compatibility. It's built on Intel® Pentium® III Xeon™ processors, Microsoft® Windows NT, Universal PCI v2.1, and USB. Standard graphics and media software APIs such as OpenGL®, DirectX®, and QuickTime® 3 are preloaded and accelerated. You can now run your favorite Windows NT applications with unsurpassed performance.

Breakthrough technology, with breakthrough value: while its performance puts it in a class with systems costing tens of thousands of dollars, Silicon Graphics 540 sells for no more than a mainstream personal workstation.

### 3D Modeling

Creating and manipulating complex 3D models call for staggering amounts of geometry and texture processing, graphics memory, and system bandwidth. Large model designs can slow conventional Windows NT workstations to a crawl. Silicon Graphics 540 overcomes these limitations, packing all the graphics acceleration, memory, and throughput needed to render the most complex 3D scenes with rich textures and sophisticated shading and lighting, at interactive speeds.



### Image Editing and Manipulation

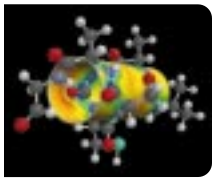
High-resolution 2D images of several hundred megabytes or more are becoming commonplace in desktop publishing, digital photography, and image analysis. To manage these large images efficiently, a system requires bandwidth and memory capacities beyond the reach of ordinary Windows NT workstations. Silicon Graphics 540 has all the resources needed to efficiently load, view, and edit even the largest images.

### Video Editing

Silicon Graphics 540 supplies the professional video interfaces and high system bandwidth needed to work with compressed and uncompressed analog and digital video in real time. Moreover, its integrated graphics and video architecture allows high-quality compositing and video texture mapping—impossible with separate graphics and video cards. You can perform nonlinear editing using multiple streams of analog or digital video, or mix video with 2D or 3D graphics—all in real time, without sacrificing quality. The optional serial digital video I/O card provides two channels of D1 video in and two channels of D1 video out simultaneously for professional video applications.

### Analysis

Computer-aided analysis is among the most processing-intensive tasks, requiring scalable processing, large memory, and high system bandwidth. It is also becoming an increasingly essential part of mechanical design and scientific research. With its quad processor scalability, large system memory, and extraordinary throughput, Silicon Graphics 540 provides analytic capabilities far beyond most personal workstations. No other system combines the power of four Pentium III Xeon processors with the graphics and bandwidth capabilities of the Silicon Graphics 540 visual workstation.



### Visualization

Interacting with large, complex data sets, including 3D textured scenes, requires geometry and texturing capabilities beyond the reach of ordinary Windows NT workstations. With the extraordinary geometry, texturing, and scalable processing capabilities of the Silicon Graphics 540 workstation, architectural walk-throughs, flight and battle simulations, and 3D game environments can be accomplished in real time.

[ VISUAL COMPUTING ]

# The Ultimate Graphics and Media Workstation

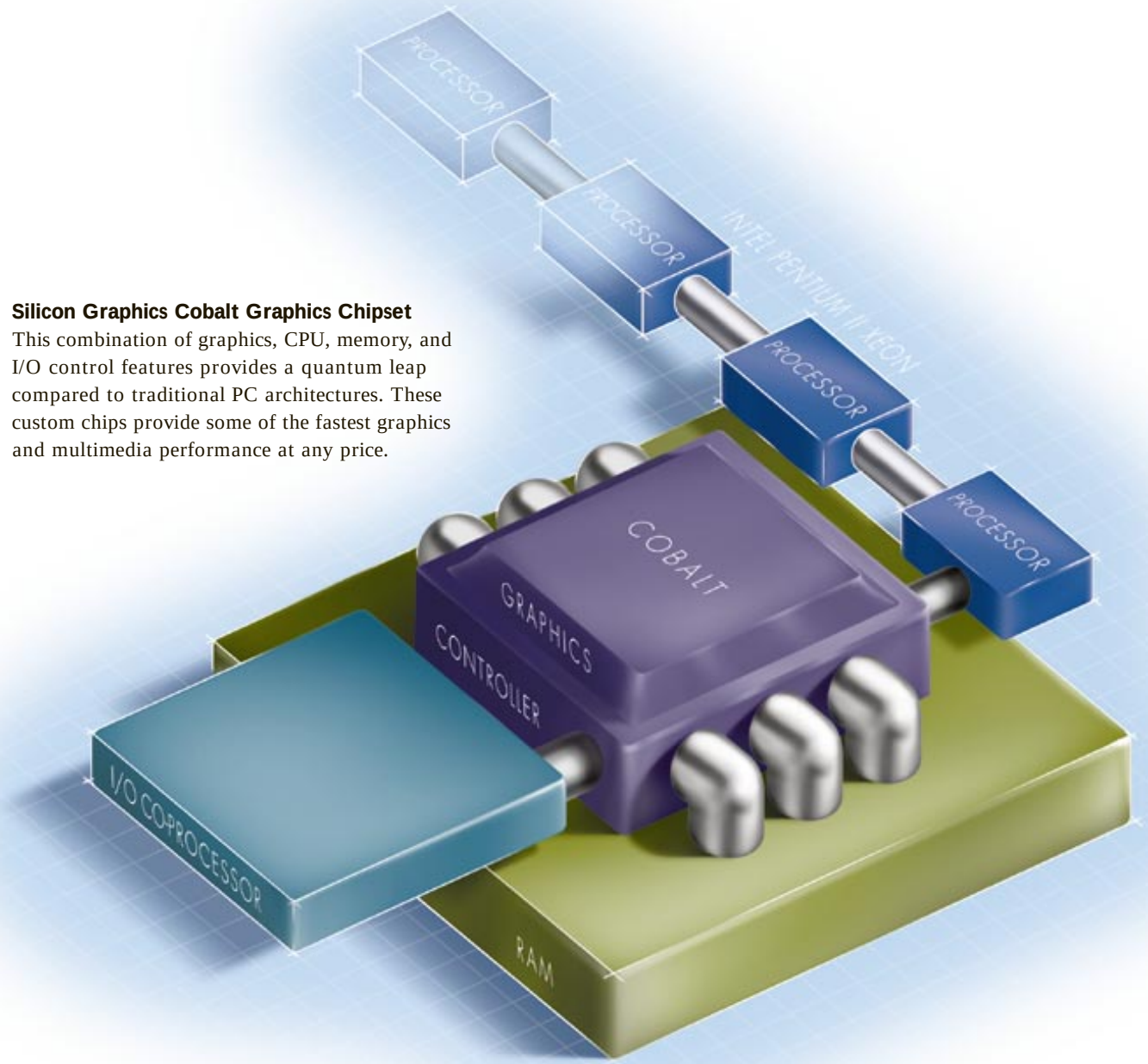

Silicon Graphics 540 is designed to provide a total solution for visual professionals, and that means addressing the full array of tasks, from 3D modeling and image editing to analysis, video editing, and visualization. These are the basic building blocks of visual computing. Whether you're an architect or a graphic artist, a game designer or an automotive engineer, a satellite image analyst or a video effects specialist, your work is likely to involve some combination of these fundamental tasks.

Fortunately, Silicon Graphics is taking the visual capabilities of NT workstations to places never dreamt of before. Few competitive systems can accomplish even one of these visual computing tasks; none can handle them all. Silicon Graphics 540 provides outstanding performance in all facets of visual computing, enabling you to move from task to task with unprecedented speed and responsiveness. The result is an explosive productivity boost, accelerated time to insight, and exciting new creative possibilities.

## SILICON GRAPHICS 540 QUICK SPECS

- Supports up to four Intel Pentium III Xeon processors
- Silicon Graphics Integrated Visual Computing architecture with Cobalt™ graphics chipset
- Scalability to 2GB ECC SDRAM memory
- Standard Ultra2 SCSI drive with up to 54GB disk capacity
- 10/100Base-T, IEEE-1394*, USB, S-video, composite video, and audio
- Optional dual serial digital video I/O

*Requires additional software.




**Silicon Graphics Cobalt Graphics Chipset**
This combination of graphics, CPU, memory, and I/O control features provides a quantum leap compared to traditional PC architectures. These custom chips provide some of the fastest graphics and multimedia performance at any price.

### Cobalt Graphics and Memory Controller

Combining the most advanced graphics engine available for Windows NT, unheard-of memory bandwidth, and a multiprocessor interface, the memory controller ensures that your most critical data is on the shortest possible path. The tightly coupled Cobalt graphics engine performs lightning-fast 3D geometry, sophisticated shading, lighting, hardware-accelerated texturing, and pixel fill.

The memory controller also includes a unique dynamic memory allocation feature whereby huge amounts of memory (up to almost 2GB) can be made available on an as-needed basis for texturing, frame buffering, z-buffering, video, I/O buses, and other DMA (direct memory access) transactions.

### I/O Co-processor

In traditional PC-architecture systems, graphics, media, and other I/O functions are supplied by add-in cards, which support much smaller memory capacities and squeeze data through much slower interconnects such as PCI and AGP.

In contrast to traditional PC architectures, Silicon Graphics 540 has an integrated input/output co-processor, delivering much higher throughput and advanced multimedia capabilities. It integrates S-video and composite video and IEEE-1394*, providing 12 times the bandwidth of 32-bit PCI subsystems. The I/O co-processor also supports the Silicon Graphics serial digital video card for two simultaneous streams of uncompressed video I/O.

### High-Speed Interconnects

The bus connecting the memory controller and RAM moves data to and from main memory at an astounding 3.2GB per second—six times faster than an AGP 2X graphics bus.

Two independent 64-bit PCI buses provide exceptional I/O bandwidth, supporting high-speed disk drives and networks (such as ATM or FDDI) without bus contention. Six full-length PCI slots support a wide range of Universal PCI add-in cards. With Fast Ethernet, analog and digital video, high-quality audio, and IEEE-1394* connectors already built in, the Silicon Graphics 540 system's slots provide plenty of room for add-on peripherals and extra connectivity.

### Intel Pentium III Xeon Processors

Up to four Intel Pentium III Xeon microprocessors provide the pinnacle of Intel processor performance. Your Silicon Graphics 540 workstation features the fastest Intel Pentium III Xeon processors available, with performance-enhancing features such as a dual independent (cache and system) bus architecture, dynamic execution, Intel MMX™ multimedia technology, and a closely coupled Level 2 cache bus running at the full speed of the processor, with cache capacities up to 2MB.

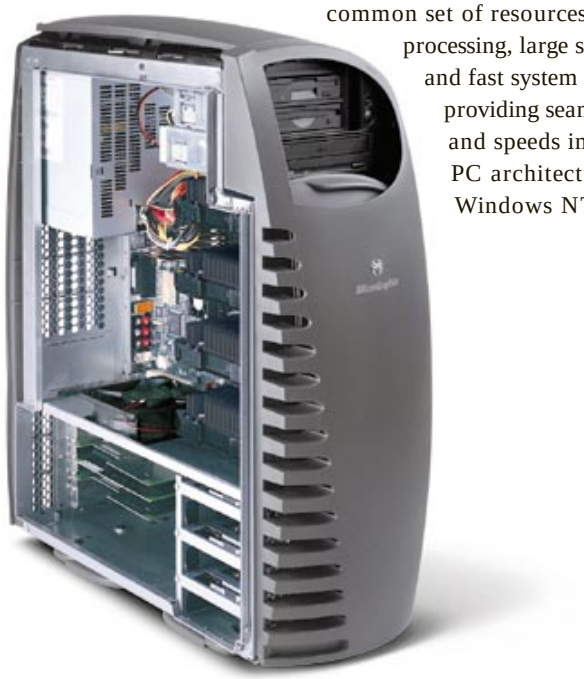
*Requires additional software.

[ BANDWIDTH ]

# Breaking the Barriers

## The Integrated Visual Computing Architecture

The heart of the Silicon Graphics 540 visual workstation is the IVC architecture, combining a powerful graphics chipset and high-speed interconnects, optimized for maximum performance. From graphics to video, all functions take advantage of a common set of resources—high-speed processing, large system memory, and fast system interconnects—providing seamless integration and speeds impossible with PC architecture-based Windows NT workstations.



**Fast, High-Capacity Mass Storage**

You can configure Silicon Graphics 540 with up to three Ultra2 SCSI hard disk drives, connected via a 64-bit PCI bus for a maximum transfer rate of 80MB/sec. Disk drive options include 9.1GB/7,200 RPM; 9.1GB/10,000 RPM; or 18GB/10,000 RPM. In addition, a 144MB floppy disk drive and 32X CD-ROM drive are included as well as a 3.5-inch expansion bay for removable media devices.

[ SUPERWIDE ]

# Ultimate Display Technology

What good is visual computing without visible results? Select from a wide array of outstanding monitors from Silicon Graphics, including the category-defining, new Silicon Graphics 1600SW flat panel monitor. This affordable 17.3-inch (17.3-inch viewable), high-resolution flat panel monitor provides stunning realism with brilliant color and crisp, precise lines for uncompromised quality and performance. With its unique 1600 x 1024 resolution at 110 dpi, Silicon Graphics 1600SW increases screen real estate and viewing angle while enhancing image quality. Its OpenLDI digital interface drives consistent corner-to-corner 24-bit color.

Silicon Graphics 1600SW provides many advantages over CRTs, including superior color saturation, brightness, and contrast (with a 200:1 contrast ratio) as well as smaller size and weight, lower heat dissipation, and lower power consumption.

**ColorLock™— Color Calibration Solution**

The revolutionary Silicon Graphics 1600SW monitor is the first flat panel display with ColorLock, a built-in color calibration solution that manages the adjustment, measurement, and setting of display characteristics to a known standard. When combined with the Silicon Graphics 540 visual workstation, Silicon Graphics 1600SW comes complete with calibration hardware and easy-to-use software. Setting display parameters remotely ensures color consistency across multiple devices and throughout the work group.



Silicon Graphics 1600SW is part of a complete family of display products that includes 17-inch (16.3-inch viewable area) and 21-inch (19.8-inch viewable area) CRT monitors.

[ PERFORMANCE ]

# Integrated Professional Digital Media

**Silicon Graphics Peripherals**

When it comes to digital media, these visual workstations go far beyond the capabilities of any other Windows NT workstation. Analog audio and video capabilities are built into every Silicon Graphics 540 workstation with the system bandwidth to support two simultaneous streams of uncompressed video I/O. Silicon Graphics 540 can also display full-screen, uncompressed NTSC or PAL video. Integrating digital media and powerful 3D acceleration at the system level gives these visual workstations capabilities that previously existed only on proprietary video processing systems costing many times as much. Map a live video stream around a 3D object as a living texture map for the ultimate in reality, or create 3D DVE effects in real time.

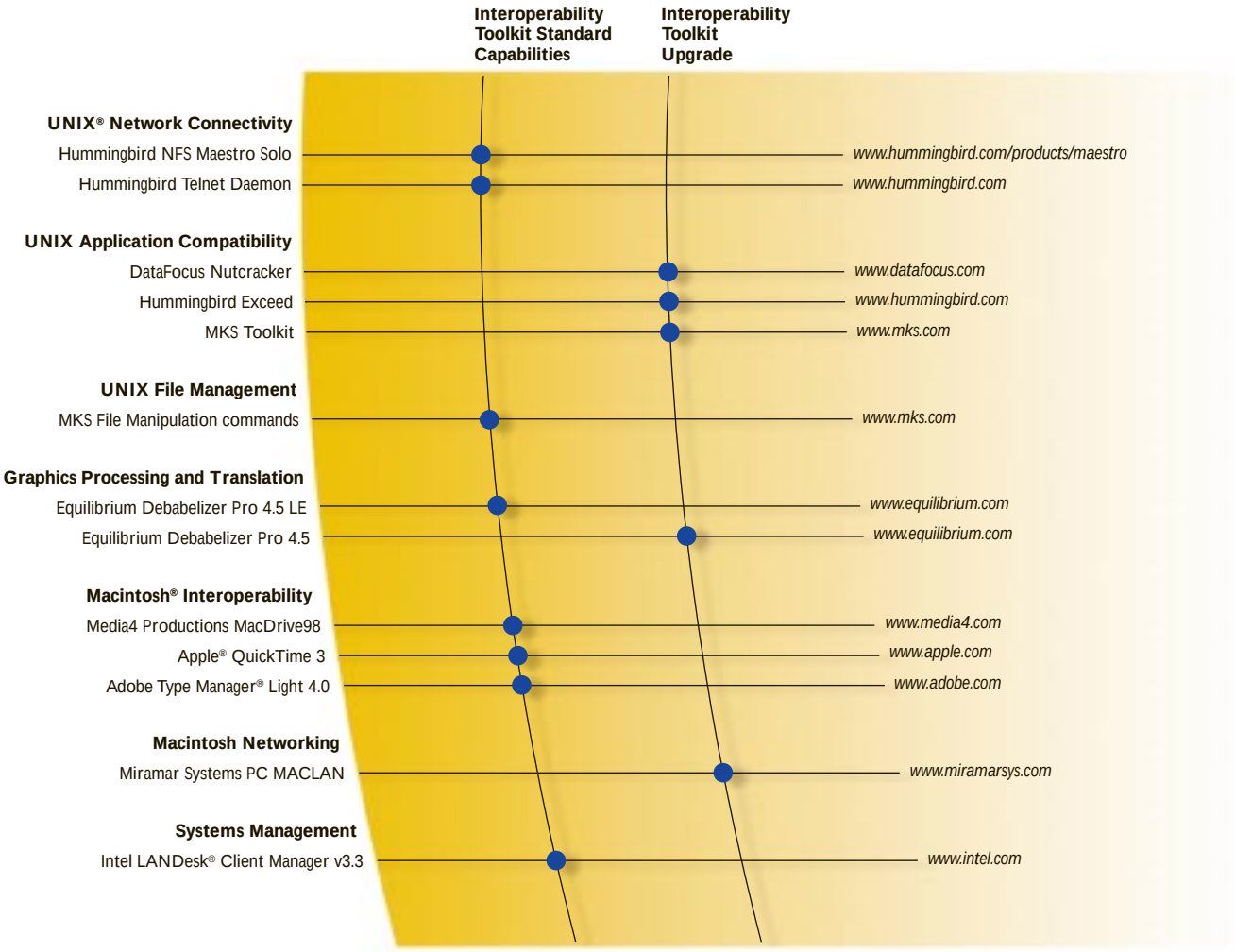
For the most demanding digital media environments, Silicon Graphics 540 offers the option of a dual-input, dual-output D1 serial digital interface.

Extend your visual computing environment with an array of peripherals designed by Silicon Graphics specifically for your visual workstation. Add an external disk array via the 64-bit Fibre Channel or the 64-bit dual-channel Ultra2 SCSI interface for two simultaneous streams of uncompressed video to disk. Plug in real-time video compression using the dual-stream motion JPEG video compression engine. There's also a 10-channel digital audio interface card that connects the visual workstation to a vast array of professional audio and video devices. A complete selection of high-quality displays, high-speed storage interfaces, disk drives, removable media, and much more is also available.

[ PERFORMANCE ]

# Software Solutions

## Out of the Box Connectivity



### Industry-Standard Manageability Features

Silicon Graphics 540 supports industry standards like DMI 2.0 and SNMP. Bundled into every Silicon Graphics 540 system is Intel LANDesk Client Manager, which takes full advantage of industry-leading manageability solutions, including CA Unicenter, Tivoli TME, HP Openview™, and Microsoft SMS. Administrators can remotely manage these systems with powerful features like hardware performance monitoring, asset management, security monitoring, and remote trouble-shooting, lowering the cost of technical computing.

### Standard Interoperability Software and Upgrade Options

Included with every system is the Silicon Graphics Interoperability Toolkit. These industry-leading interoperability applications enable connectivity and collaboration with Mac® and UNIX environments. You'll be able to share UNIX files and printers, read Mac-formatted media, remote telnet, enter UNIX commands, and even translate Mac and UNIX graphics files to Windows NT. In addition, upgrade options are offered to help you migrate your existing UNIX applications to Windows NT.

### Visual Explorations CD

This multimedia CD showcases the power of your Silicon Graphics visual workstation. Interact with a 3D model of the system, or get a hands-on introduction to the unique features of the system. You'll also learn about the extraordinary technology of 3D visualization, along with its real-world uses and market applications.

### Industry-Leading Applications, Optimized for Performance

Silicon Graphics has teamed with leading software developers to ensure that the applications you run on your Silicon Graphics visual workstation are optimized. Applications written to graphics APIs such as OpenGL run faster due to the visual workstation's API acceleration. And a new wave of advanced applications is taking advantage of the system's unique API extensions to further enhance functionality and productivity.

# Silicon Graphics 540

Technical Specifications

## PROCESSOR SUPPORT

- Intel Pentium III Xeon processor up to 500 MHz
- Scalable up to 4 processors
- Integrated L1 cache of 32KB (16KB instruction set and 16KB data set)
- Processor-integrated L2 cache (full speed)

## SYSTEM AND GRAPHICS MEMORY

- 128MB to 2GB 100 MHz (50 ns) ECC synchronous dynamic RAM (SDRAM)
- 256-bit memory bus provides 3.2GB/sec bandwidth

## COBALT GRAPHICS CHIPSET

- Rasterization of point, line, triangle, and rectangle primitives
- Rasterizer setup, attribute interpolation setup, and anti-aliased line setup from primitive vertices and vertex attributes
- Front and back face culling
- Per vertex lighting computation for up to four lights
- Connected line and triangle mesh interface
- Window clipping support through screen masks and clip IDs
- Scissored rendering, line and polygon stippling, Gouraud shading
- Texture mapping with nearest, bilinear, and trilinear mip-mapped filtering
- Anti-aliased lines
- Fogging, alpha and chroma keying, alpha blending
- Dithering for 4- and 5-bit RGB components
- Logical operations
- Color plane mask
- Specular highlights on textures
- 8-, 16-, and 32-bit color formats and 16/16, 32/32 double buffer formats
- Depth buffering for 16-bit floating point and 24-bit fixed point z values
- Off-screen buffers (p-buffers), fast buffer to buffer copy, overlay buffer
- Stencil buffering for 8-bit stencil values
- Instrument/statistics (occlusion testing and occlusion correction)
- Pixel transfers with format conversion
- Approximately 90% of total system memory available for textures
- Support for 4K by 4K pixel per texture
- Color space conversion using 4x4 color matrix
- Frame lock video synchronization
- Pixel format YCrCb 4:2:2, 4:4:4,YCrCbA 4:4:4:4
- 16-bit or 32-bit, double buffered
- 16-bit or 24-bit Z buffer
- 8-bit overlay, 8-bit stencil

**Supported resolutions**

| Resolution | Always 16.7M colors (24-bit double buffered) | |
|---|---|---|
| 640x480 | 60 Hz | |
| 800x600 | 120 Hz | |
| 1024x768 | 120 Hz | |
| 1280x1024 | 85 Hz | |
| 1600x1200 | 75 Hz | |
| 1920x1080 | 72 Hz | |
| 1920x1200 | 66 Hz | |
| 1600x1024 | 60 Hz | Silicon Graphics 1600SW digital flat panel monitor |

## SILICON GRAPHICS 540 SYSTEM FEATURES

- Full-tower design for easy access to storage and media devices
- 635 W input power supply switch selected AC, soft-power control input, LED power status indicator
- 104-key USB keyboard with integrated mouse connector, three-button mouse
- One front-accessible bay with standard, third-height, floppy drive preinstalled
- One front-accessible bay, 3.5" x 1.0" height for additional accessory
- One front-accessible bay, 5.25" CD drive preinstalled
- Three internal bays, 3.5" x 1.0" for hard disk drives (one preinstalled, two available)
- Six full-length PCI-64 slots on two PCI-64 buses

**Disk drives**

- 9.1GB/7,200 RPM or 9.1GB/10,000 RPM or 18GB/10,000 RPM Ultra2 SCSI SCA disk drives

**Integrated audio subsystem**

- 16-bit, 44.1 kHz (CD-quality) stereo input and output (RCA connector)
- MPC-3- and Direct Sound III-compatible (requires optional self-powered microphone and externally amplified speakers)
- Microphone and stereo speaker minijacks
- Yamaha S-YXG50 software synthesizer

**Integrated video subsystem**

- System bandwidth support for 2 streams of uncompressed video
- One RCA composite video (NTSC or PAL) input/output
- One mini-DIN S-video input/output
- One IEEE-1394* (400Mb/sec) connectors supporting digital cameras and other consumer media devices (supported in a future release of Windows NT)

**Integrated I/O**

- One RJ-45 10/100Base-T Fast Ethernet connector
- One 25-pin parallel port, one 9-pin serial port (16550 UART)
- Audio ports (line-in, line-out, microphone-in, speaker-out)
- One Universal Serial Bus (USB) connector for keyboard and mouse
- One additional USB connector for additional devices (supported in a future release of Windows NT)

**Optional Digital Video I/O**

- Optional Serial Digital Video I/O
- 2 CCIR 601 digital video input (2 x BNC) supporting 8-bit 4:2:2 with processing, 10-bit 4:2:2 without
- 2 CCIR 601 digital video output (2 x BNC) supporting 8-bit 4:2:2 with processing, 10-bit 4:2:2 without
- House sync in (BNC), house sync loop through (BNC)

**Digital flat panel option**

One OpenLDI multipin LVDS digital interface support for the Silicon Graphics 1600SW flat panel monitor

## OPERATING SYSTEM SUPPORT

- Windows NT workstation 4.0 with Service Pack 4 preloaded
- Silicon Graphics drivers preloaded
- Windows NT Recovery and Silicon Graphics driver CD included

## SERVICE AND SUPPORT

- Three-year limited warranty
  - One year on-site, next business day service included with purchase
- Industry-leading technical support program
  - 90 days free phone support from Silicon Graphics' customer support center for questions covering system setup and configuration, operating system installation and configuration, and hardware diagnosis
  - Warranty upgrade to 2- or 3-year on-site service with 4-hour maximum response time available at an extra charge

*Requires additional software.

Additional product and technical support information is available online from *www.sgi.com/visual* or by calling (888) 400-4SGI.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