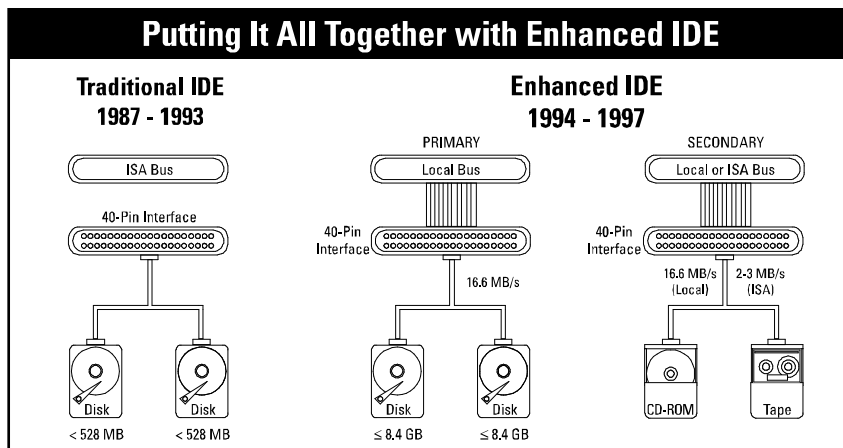


Enhanced IDE Interface

Beyond the Performance and Connectivity Constraints of IDE



Enhanced IDE (Enhanced Integrated Drive Electronics) is the latest standard used to handle communication between hard drives and the central processing unit. As with its predecessor, Enhanced IDE consists of interface controller electronics that reside on the hard drive, along with some important new features required to keep pace with the continually evolving computer industry.

Western Digital has been at the forefront in developing hard drive interfaces since 1984, beginning with its design of the ST506 interface hard disk controller used by IBM in the PC/AT systems. Subsequently, with the IDE interface that Western Digital and Compaq produced in 1986, the interface controller electronics were incorporated into the design of the hard drive rather than as a separate controller. This new technology became the industry standard for primary mass storage solutions,

because of its ease-of-use, compatibility, and low cost of connection.

Expansion in the industry triggered constant change, such as improvements to processor speeds and bus technologies, the advent of CD-ROM and other peripherals, not to mention the quest to continually improve the capacity of hard drives.

To meet these requirements, Western Digital developed Enhanced IDE, expanding upon the key attributes of IDE by:

- Providing a solution to hard drive capacity barriers
- Increasing data transfer rates
- Improving device support
- Providing support for peripherals

Breaks the Drive Capacity Barriers

Enhanced IDE overcomes drive capacity barriers. A typical system BIOS dated before August 1994

BENEFITS

- **Capacity Barriers Gone** - Breaks the 528 MB and 2.1 GB capacity barriers imposed on IDE hard drives.
- **Transfers Supported** - Supports Ultra DMA/33 Mode 2, PIO Mode 4, and multi-word DMA Mode 2 transfers for faster data throughput.
- **Two IDE Connectors** - Provides two IDE connectors for expanded peripheral attachment capabilities:
 - Can support up to four IDE devices
 - Can support a slow-speed channel and a high-speed channel, which permits support of non-disk peripherals such as IDE CD-ROM and IDE Tape plus IDE hard drives.

does not recognize drives larger than 528 MB as a result of the cylinder, head, and sector definitions of both BIOS Interrupt 13 and the IDE interface. If your system BIOS cannot recognize hard drives larger than 528 MB, you can use one of the following solutions:

- Install EZ-Drive, an installation software package that is used to overcome system BIOS limitations.
- Contact your system or BIOS manufacturer to obtain an updated BIOS, in the form of a

BIOS chip upgrade or an EIDE controller card with onboard BIOS.

Another barrier exists in some computer systems built before early 1996 which do not support hard drives with more than 4095 cylinders (hard drives larger than 2.1 GB). These BIOSs can only recognize drive capacities up to 2.1 GB. If your operating system shows your drive as having a much smaller capacity than it does, use EZ-Drive to overcome the 2.1 GB BIOS limitation. EZ-Drive can be downloaded from Western Digital's web site at www.wdc.com.

If your system locks up at boot time when the BIOS detects a drive with 4095 or more cylinders, the following solutions are available:

1. Check the IDE interface cable, power supply cable, and the jumper settings, turn on your system power, and then try to enter your CMOS setup and set the drive to auto config.
2. If your system still does not respond, disconnect the IDE interface cable from the system, go into CMOS and select a user defined drive type and enter the parameters 1023 cylinders, 16 heads, and 63 sectors. Select Type 9 if you don't have a user defined drive type.
3. Reconnect your IDE interface cable to the system and install EZ-Drive.
4. If you don't have a user defined or Type 9 drive type, use one of these solutions:
 - Upgrade your system BIOS.
 - Install an EIDE controller card with an onboard BIOS supporting hard drives larger than 2.1 GB.

- Rejumper the drive as described in the Western Digital Installation Guide. This information is also available on Western Digital's web site.

Increases Data Throughput

Today's local bus architecture has become the industry standard as end users continue to demand enhanced system performance. Maximum hard drive performance can also be obtained by taking advantage of local bus attachment.

Expanding upon the standard IDE interface timings of 2-3 MB/s, the Small Form Factor Committee (SFF) defined new PIO and DMA timings for hard drive operations in local bus environments. EIDE modes offer great improvement over traditional IDE host transfers.

Supports Four IDE Devices

Enhanced IDE takes advantage of the fact that today's operating systems support both primary and secondary IDE channels. Because the original AT architecture was defined only for hard drives, dual channel IDE provides the opportunity to expand peripheral attachments beyond hard drives. Adding a second low-cost IDE channel was a simple hardware change that has made it possible to support as many as four IDE devices on two channels. BIOS support is also required to enable this enhanced connectivity capability.

Supports IDE Peripherals and Non-Disk Peripherals

Dual channel IDE via dual IDE connectors provides the capability to support both a slow-speed and a high-speed channel. This makes it

possible to connect both fast IDE disk peripherals and slow IDE non-disk peripherals such as CD-ROM and tape. To this purpose Western Digital authored the AT Attachment Packet Interface (ATAPI). ATAPI supplements the definitions of the ATA mass storage peripheral found in the ATA specification and is compatible with existing ATA hardware, encouraging non-disk peripheral suppliers to design products according to a compatible, standardized interface.

Western Digital and the IDE Interface - Building Upon Expertise

Western Digital's Enhanced IDE program evolved from the company's storage expertise within the personal computer marketplace. Since 1984, Western Digital has set the standards for AT hard drive controllers. Western Digital continues to lead the industry by providing the Enhanced IDE interface as the solution to meet the needs of today's demanding PC environ-



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