



Pentium® II Xeon™ Processor Technology Brief

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PENTIUM® II XEON™ PROCESSOR

Product Background

The newest addition to Intel's Pentium® II brand, the Pentium® II Xeon™ processor, is Intel's first microprocessor specifically designed for mid-range and higher server and workstation platforms. The Pentium II Xeon processor combines several premium characteristics: the architectural compatibility of previous Intel microprocessor generations; the Dynamic Execution and Dual Independent Bus architecture of the Pentium II processor; and several new features designed to make this processor the right choice for powerful workstation, advanced server management, and mission-critical applications.

Powerful Caching for Demanding Applications

Because server and workstation applications place heavy demands on a processor's cache architecture, the Pentium® II Xeon™ processor is available with large, fast Level 2 (L2) caches. L2 cache sizes of 512 Kbytes or 1 Mbyte are integrated into the processor cartridge at the full operating speed of the processor core (400 MHz). The processor's Dual Independent Bus architecture combines the large, fast cache with the 100 MHz system bus to allow unprecedented transaction computing power. This is accomplished via the greater peak bandwidth made available to the processor core: 4.4 gigabytes/sec of data are available to the processor core of a Pentium II Xeon processor 450MHz. In comparison, the Pentium II processor operating at 450 MHz, designed for entry-level to mid-range workstations and servers, provides a maximum peak bandwidth to the processor core of 2.6 gigabytes/sec.

Advanced Manageability Features

Continuously monitoring every server platform within an organization can be a costly proposition. Platform manageability is key to maintaining a robust IT environment, maximizing up-time and ensuring optimal configuration and operation of servers. The Pentium® II Xeon™ processor enhances the ability of server platforms to cost effectively monitor and protect the product and its environment.

Thermal Protection

The Pentium® II Xeon™ processor helps protect itself from adverse thermal conditions, such as the failure of a cooling fan or blocked air intake by providing core thermal data to the system management software. Precise core data enables the system to track environmental conditions against manufactured specifications and take any necessary corrective action (e.g. start cooling fans in the system, alert an operator, etc.). This prevents damage to the processor or the system, protecting the customer's investment.

Error Checking and Correcting (ECC)

In addition to parity checking on the address and transaction response system signals, the Pentium® II Xeon™ processor supports ECC on the data signals for all L2 cache bus and system bus transactions. This functionality protects mission-critical data, automatically correcting single-bit errors and alerting the system to double-bit errors. All errors are logged, and a Pentium II Xeon processor-based system can track error rates to identify failing components within a system.



Functional Redundancy Checking (FRC)

The Pentium® II Xeon™ processor supports full FRC, where a processor pair acts on the same data to increase the integrity of a critical application. In an FRC pair, one processor acts as a master, the other as a checker. The checker signals the system if it detects any differences between the processors' outputs.

System Management Bus (SMBus)

As the first Intel microprocessor to incorporate a System Management Bus interface, the Pentium® II Xeon™ processor adds several manageability functions to the Intel product line. Inside the cartridge, three components have been added which use this interface to communicate with other system management hardware and software: (1) a precision thermal sensor that attaches to an on-core thermal diode, (2) a ROM containing information about the specific processor in which it resides (a.k.a. the Processor Information ROM, or P.I. ROM), and (3) a Scratch Electrically Erasable and Programmable Read-Only Memory (EEPROM), which the system vendor can use to record data about the system or processor itself. The Scratch EEPROM can be write-protected by the system.

Thermal Sensor: The thermal sensor on the Pentium® II Xeon™ processor substrate has two interfaces: one to a thermal diode on the processor core and one to the SMBus for communication with system management hardware and software. The thermal diode is a precision device that allows the thermal sensor to monitor changes to the processor core's thermal data. Changes in thermal data can be carefully tracked, and alarms can be set to automatically notify the system via a specialized signal if thermal specifications are at risk of being exceeded. This allows a thermal monitoring solution to act to protect both the processor and the application data. Protective action initiated by system management software can include turning on cooling fans within the system, alerting an operator, and/or flushing data from a processor's cache prior to initiating graceful shutdown procedures.

Processor Information ROM: The second device on the Pentium® II Xeon™ processor SMBus is a Read-Only Memory (ROM) that contains a wide variety of operational specifications, feature data, and tracking information. Among the data in the P. I. ROM are:

- Robust addressing headers to allow for flexible programming and forward compatibility
- Processor QDF/S-spec number and production status bit
- Core information, including CPUID, maximum frequency, voltage, and voltage tolerance
- L2 cache information, including size, number of components, voltage, and voltage tolerance
- Cartridge and substrate revision information
- 64-bit processor number
- Thermal reference information for temperature tracking
- Processor core and cartridge feature flags



Scratch EEPROM: The Pentium® II Xeon™ processor also contains an EEPROM device that contains no data when shipped from Intel's factory. System manufacturers or processor resellers can use this EEPROM to include whatever data they wish. It can also be used by a system to track various information about the system or the processor, including system specifications, inventory and service tracking, installation defaults, environment monitoring, usage data, or anything else the system manufacturer finds useful.

Features to Address Market Segment Needs

The Pentium® II Xeon™ processor illustrates Intel Corporation's commitment to the mid-range and higher workstation and server market segments. By offering a distinct branded processor that addresses the processing requirements and mission-critical nature of both market segments, along with advanced server management features, Intel Corporation continues its trend of offering the best solution to meet market segment needs.



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