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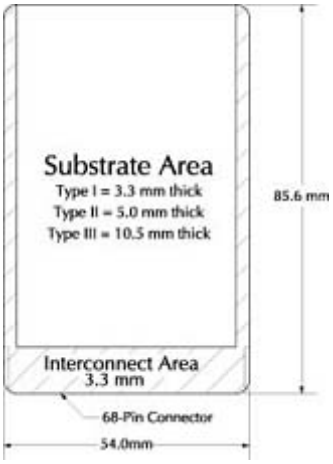
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# PC Card Technology Primer

## Introduction




In the early 90's, the rapid growth of mobile computing drove the development of smaller, lighter, and more portable tools for information processing. One of the most exciting of these innovations was PC Card technology. The power and versatility of PC Cards quickly made them standard equipment in mobile computers. The rapid development and worldwide adoption of PC Card technology has been due in large part to the standards efforts of the Personal Computer Memory Card International Association (PCMCIA).

The association's PC Card Standard is now bringing the benefits of these same PC Cards to a variety of industries and vertical applications, including smart cards, set-top boxes, automobiles, and others. The PC Card technology's compact size and ruggedness make it the ideal technology for a wide variety of applications.

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## Card Types versus Release Numbers

The PC Card Standard provides physical specifications for three types of PC Cards, with additional provisions for extended cards. All three card types measure the same length and width and use the same 68-pin connector. The only difference between the card types is thickness. The thicknesses are 3.3, 5.0, and 10.5 millimeters for Type I, Type II, and Type III cards respectively. Because they differ only in thickness, a thinner card can be used in a thicker slot, but a thicker card can not be used in a thinner slot.

The card types each have features that fit the needs of different applications. Type I PC Cards are typically used for memory devices such as RAM, Flash, OTP, and SRAM cards. Type II PC Cards are typically used for I/O devices such as data/fax modems, LANs, and mass storage devices. Type III PC Cards are used for devices whose components are thicker, such as rotating mass storage devices. Extended cards allow the addition of components that must remain outside the system for proper operation, such as antennas for wireless applications.







graphic of type III card

The release number refers to the version of the PC Card Standard that a particular card or system was based on. Basically, release 1.0 supported memory only, and 2.X releases supported memory and I/O applications.

**PCMCIA Standard Release 1.0/JEIDA 4.0 - June 1990**

The first release of the standard defined the 68-pin interface and the Type I and Type II PC Card form factors. The initial release of the PCMCIA Standard specified the electrical and physical requirements for memory cards only. It defined the Metaformat or Card Information Structure (CIS) that is critical to interoperability and plug-and-play for PC Cards. There was no concept of input/output (I/O) cards in the first release of the PC Card Standard.

**PCMCIA Standard, Releases 2.0, 2.01 and 2.1 - 1991-1994**

The second release of the standard defined an I/O interface for the same 68-pin interface as was used for the PCMCIA memory cards in the first release of the Standard. Release 2.0 also added various clarifications to the first release, support for dual-voltage memory cards, and sections dealing with card environmental requirements and test methods. Release 2.01 added the PC CardATA specification, the Type III card type, and the Auto-Indexing Mass Storage (AIMS) specification geared toward digital images was also added. It also included the initial version of the Card Services Specification. Release 2.1 further enhanced the Card and Socket Services Specificaiton, and made improvements to the Card Information Structure.

**PC Card Standard-February 1995**

The latest release of the PC Card Standard added information to improve compatibility and added support for features such as 3.3 volt operation, DMA support, and 32-bit CardBus busmastering.



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## About Compatibility

The rapid rate of adoption of PC Card slots has driven a steady stream of card and host implementations. During that time, PC Cards containing new technologies were introduced and significant new capabilities were added to the Standard. At the same time considerable experience was gained by card, host, and software vendors, and opportunities to improve compatibility were recognized.

PCMCIA's goal is to make the technology as easy to use as possible, however, the Standard can only provide guidelines in some areas so there will be manufacturers who do not follow the Standard exactly or have interpreted it differently. Therefore, development planned for flexibility and adaptability will allow for the greatest compatibility. One way to be prepared for the variety of the real world is to perform exhaustive testing of designs with all the significant components from software functions and modules to entire platforms.

During the last year, there have been three major factors that have come together to greatly improve PC Card interoperability. In the

March 1995 release of the standard, the software specification for PC Cards were improved in a number of ways. Improvements to the Card Information Structure and the guidelines for its usage improved the way that hosts recognize the features and requirments for a card when inserted.

Also part of the March 1995 release was the addition of the Guidelines document, a series of recommended guidelines for developers of specific types of PC Cards, such as modems, wireless devices, ATA cards and CardBus cards.

In addition, increasing cooperation between card, host and software developers within the industry has resulted in improved interoperability. Towards this end, PCMCIA and the Plug and Play Association regularly co-sponsor PlugFestInteroperabilty Workshops that bring together leading manufacturers from all parts of the industry.



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## Features of PC Card Technology

A Detailed Overview of the PC Card Standard

**Card Information Structure** - The CIS describes the characteristics and capabilities of the card so the host system can automatically configure it. CIS is defined in the Metaformat Specification.

**CardBus** - CardBus allows allows PC Cards and hosts to use 32-bit busmastering and to operate at speeds up to 33MHz.

**DMA** - The Standard allows cards to utilize Direct Memory Access technology directly in the hardware when matched with a corresponding host system.

**eXecute In Place (XIP)** - Allows operating system and application software to run directly from the PC Card, eliminating the need for large amounts of system RAM.

**Low Voltage Operation** - The Standard enables 3.3 and 5 volt operation. A physical keying mechanism for 3.3 volt cards protects them from being damaged in a 5 volt slot.

**Multiple Function PC Cards** - The Standard enables truly standardized multiple function PC-Cards.

**Plug and Play** - PC Cards can be inserted or removed while the system is on because power and ground contact pins are the longest contacts, ensuring that disconnect signals disengage first, preserving data integrity.

**Power Management** - The Standard provides a means to interface to APM (Advanced Power Management) through the Card Services Specification.

**Zoomed Video (ZV)** - Zoomed Video is a connection between a PC Card and host system that allows the card to write video data directly to the VGA controller. The data is transferred with no buffering requirements because it is transferred over the ZV bus and not the system bus.





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