Introduction to PCMCIA

Technical Tutorial

2002 – 12 - 06

Table of Contents

1. Introduction

PCMCIA (Personal Computer Memory Card International Association) is an international standards body and trade association founded in 1989 developed a standard for small, credit card-sized devices, called PC Cards. Originally designed for adding memory to portable computers, the PCMCIA standard has been expanded several times and is now suitable for many types of devices.

The inclusion of PCMCIA technology in PCs delivers a variety of benefits. Besides providing an industry standard interface for third party cards (PC Cards), PCMCIA allows users to easily swap cards in and out of a PC as needed, without having to deal with the allocation of system resources for those devices. These useful features -- hot swapping and automatic configuration, as well as card slot power management and other PCMCIA capabilities -- are supported by a variety of software components on the PCMCIA-based PC. In most cases, the software aspect of PCMCIA remains relatively transparent to the user.

As the demand for notebook and laptop computers began skyrocketing in the late 1980's, users realized that their expansion options were fairly limited. Mobile machines weren't designed to accept the wide array of available expansion cards that their desktop counterparts could enjoy.

2. PCMCIA/PC Card Standard Release History

➢ PCMCIA Standard Release 1.0/JEIDA 4.0 - June 1990

- 68-pin Memory-only Interface
- Type I and Type II Physical Form Factors
- Metaformat (Card Information Structure[CIS]) Defined

➢ PCMCIA Standard Release 2.0/JEIDA 4.1 - September 1991

- I/O Interface
- Dual Voltage Memory Card Support
- Card Environmental Requirements
- Socket Services API Specification
- Enhanced Metaformat (Geometry and Interleaving Tuples added)
- XIP (eXecute In Place) Specification

➢ PCMCIA Standard Release 2.01 - November 1992

- PC Card ATA Specification
- Type III Form Factor
- Auto-Indexing Mass Storage (AIMS) Specification
- Card Services API Specification
- Enhanced Socket Services support for Card Services
- Enhanced Metaformat to accommodate new PC Card functionality

➢ PCMCIA Standard Release 2.1/JEIDA 4.2 - July 1993

- Card and Socket Services Greatly Enhanced
- Enhancements to Electrical and Physical Specifications
- Further enhanced Metaformat

➢ PC Card Standard Release 5.0 - February 1995

- CardBus 32-bit Bus Mastering Interface
- Card Information Structure Required on all PC Cards
- Low Voltage-only Operation (3.3V)
- Support for Hardware Direct Memory Access (DMA)
- Industry standard power management interface (APM)
- Multiple Function Cards
- Guidelines Volume added

➢ PC Card Standard 5.01 Update - March 1995

- General editorial changes

➢ PC Card Standard 5.02 Update - May 1995

- Electrical Specification editorial changes

- ➢ PC Card Standard 5.03 Update - November 1995

  - Support for Custom Interfaces

- ➢ PC Card Standard 5.04 Update - March 1996

  - Added Zoomed Video (ZV Port) Custom Interface and Flash Translation Layer (FTL)

- ➢ PC Card Standard Release 6.0 - March 1997

  - Thermal Ratings System
  - ISDN, Security, and Instrumentation Card Tuples
  - Hot Dock/Undock Support
  - Streamlined PC Card Configuration

- ➢ PC Card Standard 6.1 Update - April 1998

  - PCI Power Management
  - Small PC Card Form Factor
  - Win32 Socket Services Bindings

- ➢ PC Card Standard 7.0 Release - February 1999

  - PC Card Memory Paging
  - DVB Custom Interface
  - Windows NT 4.0 Kernel mode Socket Services Bindings

- ➢ PC Card Standard 7.1 Update - March 2000

  - OpenCable(TM) POD Custom Interface

- ➢ PC Card Standard 7.2 Update - November 2000

  - Removal of support for Direct Memory Access (DMA)
  - Zoomed Video (ZV) Port Register Model
  - Updated PC Card ATA Specification
  - Limited Host Guideline

- ➢ PC Card Standard 8.0 Release - April 2001

  - CardBay USB Interface
  - Vcore Supplemental Voltage

In more recent years, PCMCIA has realized the need for higher speed applications such as multimedia and high-speed networking. From this realization came the CardBus and Zoomed Video Specifications which allow blazing speed in such applications as MPEG video and 100 Mbit Ethernet.

3. Physical Specification

The PC Card Standard provides physical specifications for three types of PC Cards, with provisions for extended cards. Each card type has features that fit the needs of different applications.

3.1. Types of PC Cards

3.1.1. Type I PC Cards are typically used for memory devices such as RAM, Flash, OTP, and SRAM cards.

3.1.2. Type II PC Cards are typically used for I/O devices such as data/fax modems, LANs, and mass storage devices.

3.1.3. Type III PC Cards are used for devices whose components are thicker, such as rotating mass storage devices. These Extended cards allow the addition of components that must remain outside the system for proper operation, such as antennas for wireless applications.

PC Card Physical Characteristics

Physical Interface	68 Pins
Back End I/O Conn.	Proprietary*
Length	85.6 mm
Width	54.0 mm
Thickness	Type I = 3.3 mm Type II = 5.0 mm Type III = 10.5 mm
Operating Temp.	0 to 55 C
Storage Temp.	-20 to 65 C
Minimum Insertions	Office Env. 10,000 Harsh Env. 5,000

All three-card types measure the same in length and width, and use the same 68-pin connector along the edge for connecting to a computer. The only difference between the card types is thickness, which vary as 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 cannot be used in a thinner slot.

3.2.   Types of PCMCIA slots

As with the cards, PCMCIA slots also come in three sizes:

- ➢ A Type I slot can hold one Type I card
- ➢ A Type II slot can hold one Type II card or two Type I cards
- ➢ A Type III slot can hold one Type III card or a Type I and Type II card.

4. Features of PC Card Technology

4.1. 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.

4.2. CardBus: -

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

4.3. DMA: -

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

4.4. 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.

4.5. 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.

4.6. Multiple Function PC Cards: -

The Standard enables truly standardized multiple function PC-Cards.

4.7. 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.

4.8. Power Management: -

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

4.9. 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.

5. Utilities of PCMCIA card in the Networking category

Under the networking category, typically PCMCIA slot supports 4 types of cards.

- LAN card
- Wireless LAN card
- Modem card
- ATA flash disk card

Wireless networking is one of the most recent major advances in the world of telecommunications. The ability to communicate and send data without a physical connection is becoming more popular at a very quick rate. In other words, a wireless LAN is one in which a mobile user can connect to a local area network (LAN) through a wireless (radio) connection. A standard, IEEE 802.11, specifies the technologies for wireless LANs. The standard includes an encryption method, the Wired Equivalent Privacy algorithm.

6. List of PC Card Manufacturers

6.1. Network PC Card Manufacturers

Manufacturer	Web Reference
3Com	http://www.3com.com
Aironet	http://www.aironet.com/
Ambicom, Inc.	http://www.ambicom.com/
Billionton Systems Inc	http://www.billionton.com.tw
Compaq Computer	http://www.hp.com/
IBM	http://www-3.ibm.com/chips/index.html
Intel	http://www.intel.com/
Madge Networks	http://www.madge.com/
Methode Electronics, Inc.	http://www.methode.com/connector/
Silicom , Ltd.	http://www.silicom.co.il/
TDK	http://www.tdksystems.com/
Xircom, Inc.	http://www.xircom.com/

6.2. PC card supported by VTS: - VTS Supports below list of PC cards.

Table C-1 Network card

Manufacturer	Model/Name	VTS probed Model name	Specification

Table C-2 Wireless Network card

Manufacturer	Model/Name	VTS probed Model name	Specification
Cisco Systems	AIR-PCM340/Aironet 340	Cisco Systems 340 Series Wireless LAN Adapter	11 Mbps Wireless LAN Adapter

Table C-3 ATA/IDE Fixed Disk Card

Manufacturer	Model/Name	VTS probed Model name	Specification
Advantech	CompactFlash	CF 48M	48 MB Wireless LAN Adapter
SanDisk	SDP series	SunDisk SDP 5/3 0.6	64 MB
Kingston	CompactFlash Storage Card	TOSHIBA THNCF064MAA	64 MB
Viking	CompactFlash	TOSHIBA THNCF064MBA	64 MB

Table C-4 Serial Modem Card

Manufacturer	Model/Name	VTS probed Model name	Specification
Billionton Systems Inc.	FM56C series	PCMCIA CARD 56KFaxModem FM56C-NFS 5.41	Ambient (Intel) V.90 FAX/MODEM PC Card
Viking	PC Card Modem 56K	Viking V.90 K56flex 021 A	MODEM PC Card
KINGMAX	KIT PCMCIA 56K Fax/Modem Card	CIRRUS LOGIC 56K MODEM CL-MD56XX 5.41	V.90 FAX/MODEM PC Card

7. Conclusion

Today, PCMCIA promotes the interoperability of PC Cards not only in mobile computers, but also in such diverse products as digital cameras, cable TV, set-top boxes, and automobiles. As the variety of products that need modular peripheral expansion has grown, so has the diversity of the capabilities of modular peripherals. As such, PCMCIA has recently changed its mission statement: "To develop standards for modular peripherals and promote their worldwide adoption." As computing needs become faster and smaller, PCMCIA continues to set the standard.