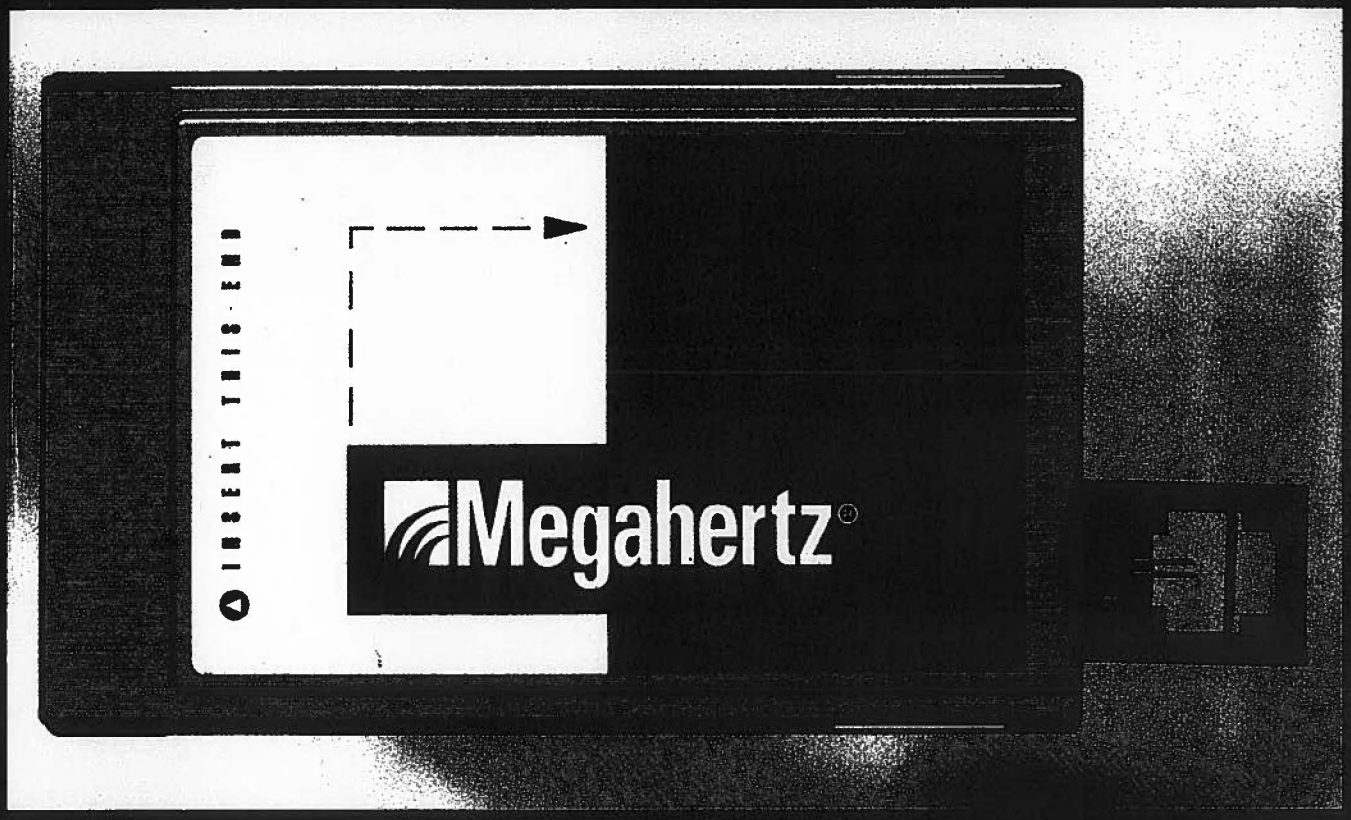
PCMCIA Primer



Larry Levine

- The complete guide to using and troubleshooting PCMCIA cards
- Evaluates Type I, II, III & IV cards
- Troubleshooting guide to PCMCIA installation and configuration

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CHAPTER 5

SEQUENCE OF EVENTS

By now, you should have a pretty good understanding of how each of the components within the PCMCIA architecture function—independently of one another. The architecture was presented in a bottom-up fashion to enable you to see how each of the services and functions within the PCMCIA architecture is abstracted. In getting such a detailed explanation of the services at each level, however, you may have lost sight of the forest for the trees. This chapter gives you a walk-through of what happens when various types of PC Cards are inserted into the system's PCMCIA slots. We will walk through the initialization, recognition, configuration, and use of an I/O PC Card and a memory PC Card. The exact same set of events occurs for all PC Cards within each class. The things that change with different types of PC Cards, however, are the clients that actually provide the recognition and configuration services as well as the resources actually needed by the PC Cards. This walk-through of a PC Card insertion summarizes the resulting events for all types of PC Cards and clients.

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NOTE

For the remainder of this chapter, I describe a series of events and further processing that *might* and, in my opinion, *should* occur. This chapter does not attempt to describe any one or multiple implementations of PCMCIA 2.1, but rather an interpretation of the PCMCIA 2.1 specifications. In particular, this is *my* interpretation and theoretical implementation. Different vendors have their own, different interpretations and implementations.

Initialization

Before anything can happen with the PC Cards, the PCMCIA handlers must be loaded and initialized. This is accomplished differently on different PCs with different PCMCIA handler implementations. In all likelihood, they are loaded as device drivers within the DOS **CONFIG.SYS** file.

Socket Services is the first to be loaded. Quite simply, it recognizes the PCMCIA controller, resets the controller's configuration, installs a Card Status Change (CSC) interrupt handler, and installs itself as an INT 1AH handler.

Card Services is loaded next; it initializes its resource and client databases. It looks for Socket Services in memory, installs its *own* Card Status Change interrupt service routine replacing the one installed by Socket Services, and installs its *own* INT 1AH handler, again replacing the one installed by Socket Services. Lastly, it gathers the Memory, I/O, and IRQ resources into its database of *available* resources for allocation to PC Cards.

Finally, a set of Card Services clients registers with Card Services to provide recognition and configuration services to memory and I/O cards. This set of clients varies greatly depending on vendor implementation and user configuration.

After all the PCMCIA handlers and Card Services clients are loaded, the system is ready for insertion of PC Cards.


NOTE

In fact, PC Cards can be recognized and configured before *all* the PCMCIA handlers and clients are running. To provide any more insight at this point as to how or why this is possible would only confuse you. I will provide more insight into this in the "Troubleshooting" appendix.

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Insertion, Recognition, and Configuration Processing

The first few steps of PC Card insertion processing (which all usually occur in less than 1 second) are identical for all types of PC Cards. Therefore, there will be only one discussion of the first few steps, in the "Insertion Processing" section. The recognition and configuration of I/O PC Cards and memory PC Cards tend to differ slightly. For this reason, the recognition and configuration of these cards are broken out into their own, appropriately named, "I/O PC Card Recognition and Configuration" and "Memory PC Card Recognition and Configuration" sections.

Insertion Processing

1. The first thing that happens, of course is that the PC Card is inserted into the PCMCIA slot (see Figure 5.1). Slowing this down, you can see how it makes sense that the power signals (Vpp and Vcc) are connected first through the longest pins. Next, the data, address, and various control signals make contact via the medium-length pins. Finally, the Card Detect (CD) pin makes contact. The connection of the Card Detect pin with a PC Card causes a Card Status Change interrupt to occur.
2. Having installed a Card Status Change interrupt service routine, Card Services is ready to handle the Card Status Change interrupt that just occurred when the Card Detect pins made contact with the PC Card. Card Services issues an *AcknowledgeInterrupt()* Socket Services call and will usually queue this event for later processing (possibly after an internal timer expires). It does this so that the Card Status Change interrupt can be returned as quickly as possible to avoid the possibility of the system missing lower-priority interrupts (Card Services is a good citizen here) and to *debounce* the Card Status Change signal in software as it is not done in hardware.

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