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TITLE OF THE INVENTION

PCMCIA SMART CARD READER

BACKGROUND OF THE INVENTION

The present invention relates to a smart card reader in general. More particularly,
5 the present invention relates to a smart card reader built into a PCMCIA card (also called a PC Card).

Consumer use of credit cards, identification cards for giving access to certain premises, and bank cards, also referred to as "cash cards", etc., has steadily increased in recent years. This increased consumer activity, combined with advances in the portable
10 computer market, has resulted in a significant increase in the use of so-called "smart cards". Despite being the same size as a credit card, which stores information on a magnetic strip, the smart card stores significantly more information than the credit card by using an integrated microprocessor chip located within the body of the smart card. The microprocessor chip enables the smart card to store and secure a wide variety of
15 information, including monetary value for retail and vending machine use; personal information such as medical and healthcare records, and so forth. Depending on the microprocessor chip capabilities, new information and/or applications may also be added.

In addition to storing more information, smart cards are more reliable, perform multiple functions, and utilize high security mechanisms such as advanced encryption to
20 increase security. This ability for increased security is expected to be a significant factor in

making the smart card an integral part of retail trade via the Internet. All of the storage and security advantages of the smart card have contributed to an increased growth in smart card applications.

Smart card readers are used to communicate with the smart card. When the smart card is inserted within the smart card reader, the smart card reader reads and writes information from and to the smart card through smart card contacts that connect to terminal points on the smart card surface. The terminal points are bonded to the microprocessor chip inside the smart card. It is important for the smart card to be accurately aligned with the smart card reader in order to assure a reliable electrical connection with the terminal points. In addition to the smart card contacts, the smart card reader also includes electronic components and often a microprocessor that interfaces with the smart card. Smart card readers can be separate devices connected to the serial port of a personal computer or can be built into other equipment such as bank terminals, personal computer keyboards, modems etc.

Portable computers often have one or two expansion slots standardized by the Personal Computer Memory Card International Association ("PCMCIA"). PCMCIA cards (also called PC Cards) can be inserted into these slots to expand the functionality of the computer. Memory, modems, GSM adapters, ethernet adapters and smart cards readers are examples of PCMCIA cards. While a PCMCIA card also has the same width and length as a credit card, it is usually 5 mm thick, and is therefore somewhat thicker than a credit card. As with the smart card reader, several functions can also be combined into the same PCMCIA card.

Smart card functionality can be added to a portable computer by inserting a PCMCIA smart card reader into a free expansion slot. However, the number of expansions slots on a portable computer is usually very limited. Since smart cards are often used in applications requiring communication by a modem, a LAN, or an ISDN adapter, this limited number of available expansion slots makes it highly desirable to combine the PCMCIA smart card reader with a modem or other function. In addition, the length and width of the smart card is the same as the length and width of a PCMCIA card, and therefore the mechanical realization of a PCMCIA smart card reader is difficult to achieve. For example, a slot that is formed in the PCMCIA card for inserting the smart card separates the PCMCIA card into an upper and a lower portion. Since the PCMCIA card must remain within the standardized dimensions, and because the width of the smart card is equal to the width of the PCMCIA card, there is no room for a mechanical support between the upper and lower part.

This lack of available space for a mechanical support between the upper portion and lower portion can be seen in the prior art PCMCIA smart card readers illustrated in FIGS. 1A-1D. As illustrated in FIGS. 1A and 1B, a prior art smart card reader 100 has a length and width that is approximately equal to a length and width of a smart card 102. A slot 104 for receiving the smart card 102 is formed by an upper portion 106 and a lower portion 108 of smart card reader 100. As illustrated in FIG. 1B, upper portion 106 is substantially thinner than lower portion 108. A smart card contact (not shown) is located along lower portion 108, at an innermost end 112 of slot 104. Therefore, smart card 102 must be fully

inserted within slot 104 of smart card reader 100 in order to come into contact with the smart card contact.

When fully inserted within slot 104 of smart card reader 100, smart card 102 separates upper portion 106 and lower portion 108 of smart card reader 100. As a result, upper portion 106 and lower portion 108 are unsupported at an opening 110 of slot 104. This lack of support makes upper portion 106 and lower portion 108 prone to being damaged during insertion of smart card 102 within smart card reader 100, or during transport of smart card reader 100. By being substantially thinner than lower portion 108, upper portion 106 is most prone to being damaged.

Since smart card reader 100 is relatively the same size as smart card 102, the amount of available space within smart card reader 100 is extremely limited. As described above, the physical dimensions of the smart card reader are dictated by PCMCIA standards, and therefore it is not possible to increase the dimensions of the smart card reader to make room to form the necessary support for upper portion 106 and lower portion 108. A printed circuit board (not shown) on which electronic components of the smart card reader 100 are located, is positioned along lower portion 108 of smart card reader 100. As a result of the PCMCIA dimensional limits and the limited amount of available space, space around the printed circuit board of smart card reader 100 is limited, which limits the amount of additional electronic functions that can be added to the smart card reader 100. In addition, by placing the smart card contacts along lower portion 108 of smart card reader 108, the available space around the printed circuit board is limited even further.

In addition to causing upper portion 106 of smart card reader 100 to be weakened, the lack of mechanical support at opening 110 of slot 104 makes the insertion of smart card 102 difficult. For example, when inserted within smart card reader 100, smart card 102 is not aligned in a sideways manner by smart card reader 100, but is merely guided by guides
5 located within the PCMCIA card slot of a computer device which are intended to guide insertion of smart card reader 100 within the PCMCIA card slot. Since these guides are located at a distance within the PCMCIA card slot, smart card 102 must be inserted a significant distance within the PCMCIA card slot before receiving sufficient support by the guides. Finally, because the PCMCIA card slot is normally located at a side of the
10 computer device, it is often difficult for a user to see slot 104, making insertion of smart card 102 difficult.

As illustrated in FIGS. 1C and 1D, prior art smart card readers have attempted to strengthen upper portion 106 of smart card reader 100 by forming a mechanical support 114 between upper portion 106 and lower portion 108 of smart card reader 100. However,
15 in order to form mechanical support 114, the size of smart card reader 100, and in particular the length of smart card reader 100, is increased beyond the standardized PCMCIA card dimensions. This increased length causes smart card reader 100 to extend outside of the PCMCIA card slot of the computer device, making smart card reader 100 prone to physical damage during transport of the computer device. As a result, smart card
20 reader 100 must be removed when transporting the computer device, which tends to be extremely annoying given the portable nature of a lap top computer device.

BRIEF SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a PCMCIA smart card reader that is portable and mechanically stable.

It is a further object of the present invention to provide a PCMCIA smart card reader that enables additional functions to be included in the PCMCIA smart card.

It is another object of the present invention to provide a PCMCIA smart card reader that is mechanically stable, that does not protrude outside a computer device when in use, and that makes insertion of a smart card less difficult.

Objects of the present invention are achieved by a PCMCIA smart card reader that is insertable within a card slot of a computer device to enable reading of a smart card that includes a support member that mechanically supports an upper section and a lower section of the PCMCIA smart card reader. The support member is positioned within the card slot when the PCMCIA smart card reader is inserted in the card slot, and guides insertion of the smart card within the PCMCIA smart card reader.

Further objects the present invention are achieved by PCMCIA smart card reader that is insertable within a card slot of a computer device to enable reading of a smart card. The PCMCIA smart card reader includes a reading member that has a back portion. The back portion limits the insertion of the smart card within the PCMCIA smart card reader. A smart card contact is positioned along an upper section of the PCMCIA smart card reader. A support member mechanically supports a front edge of the upper section and a front edge of a lower section of the PCMCIA smart card reader. The support member is

positioned within the card slot when the PCMCIA smart card reader is inserted in the card slot, and guides insertion of the smart card within the PCMCIA smart card reader.

Further objects of the present invention are achieved by a PCMCIA smart card reader that is insertable in a card slot of a computer device to enable reading of a smart card. The PCMCIA smart card reader includes a removable extension that has an upper surface positioned in substantially the same horizontal plane as an upper surface of a lower section of the PCMCIA smart card reader. A reading member of the PCMCIA smart card reader has a back portion that limits the insertion of the smart card within the PCMCIA smart card reader. A smart card contact is positioned along an upper section of the PCMCIA smart card reader. A support member mechanically supports a front edge of the upper section and a front edge of a lower section of the PCMCIA smart card reader. The support member is positioned within the card slot when the PCMCIA smart card reader is inserted in the card slot, and guides insertion of the smart card within the PCMCIA smart card reader.

Still further objects of the present invention are achieved by an apparatus that enables a smart card to interface with a computer device using a PCMCIA smart card reader insertable into a card slot located along a side of the computer device. The apparatus includes guide members positioned within the computer device, and a support member. The support member is positioned between the guide members and the side of the computer device, and mechanically supports an upper section and a lower section of the PCMCIA smart card reader. The apparatus also includes a removable extension that has an upper surface positioned in substantially the same horizontal plane as an upper surface of

the lower section of the PCMCIA smart card reader. A reading member has a back portion that limits a distance that the smart card is inserted in the PCMCIA smart card reader. A smart card contact of the apparatus is positioned along the upper section of the PCMCIA smart card reader.

5 BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1A is a top view of a Prior Art PCMCIA smart card reader.

10 FIG. 1B is a side view of the Prior Art PCMCIA smart card reader of FIG. 1A.

FIG. 1C is a top view of a Prior Art PCMCIA smart card reader.

FIG. 1D is a cross-sectional side view of the Prior Art PCMCIA smart card reader of FIG. 1C, taken along section line 1D-1D.

15 FIG. 2A is an exploded perspective view of a PCMCIA smart card reader according to a preferred embodiment of the present invention.

FIG. 2B is a cross-sectional side view of a top section of the PCMCIA smart card reader of FIG. 2A, taken along section line 2B-2B.

FIG. 2C is a cross-sectional side view of a reading member of the PCMCIA smart card reader of FIG. 2A taken along section line 2C-2C.

FIG. 3 is a perspective view of a fully assembled PCMCIA smart card reader according to a preferred embodiment of the present invention, illustrating insertion of a smart card into the PCMCIA smart card reader.

5 FIG. 4 is a side view of a reading member of a PCMCIA smart card reader according to a preferred embodiment of the present invention.

FIG. 5A is a perspective view of an insertion of a fully assembled PCMCIA smart card reader according to a preferred embodiment of the present invention within a card slot of a computer.

FIG. 5B is a partial perspective view of a guide positioned in a computer device.

10 FIG. 5C is a partial perspective view illustrating insertion of a PCMCIA smart card reader according to a preferred embodiment of the present invention within a card slot of a computer device.

FIG. 6A is a perspective view of a removable extension of a PCMCIA smart card reader according to a preferred embodiment of the present invention.

15 FIG. 6B is a partial perspective view of the removable extension of FIG. 6A.

FIG. 7A is a perspective view of a removable extension of a PCMCIA smart card reader according to an alternate preferred embodiment of the present invention.

FIG. 7B is a partial perspective view of the removable extension of FIG. 7A.

20 FIG. 8A is a perspective view of a removable extension of a PCMCIA smart card reader according to an alternate preferred embodiment of the present invention.

FIG. 8B is a partial perspective view of the removable extension of FIG. 8A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

5 A PCMCIA smart card reader 20, according to a preferred embodiment of the present invention, is illustrated in FIG. 2A. PCMCIA smart card reader 20 includes a label 21, an upper section 22, a reading member 23, a printed circuit board 24, and a lower section 26, all having corresponding rectangular configurations. As illustrated in FIGS. 2A and 3, label 21 is placed on upper section 22, and upper section 22 and lower section 26 are
10 fitted together when PCMCIA smart card reader 20 is fully assembled, to enclose reading member 23 and printed circuit board 24.

 As illustrated in FIGS. 2A-2C, both upper section 22 and reading member 23 include corresponding front edges 25 and 27, respectively. As illustrated in FIG. 2B, front edge 25 of upper section 22 includes a rounded inner portion 29, while, as illustrated in
15 FIG. 2C, front edge 27 of reading member 23 includes a rounded outer portion 30. Rounded inner portion 29 of upper section 22 is formed to receive rounded outer portion 30 of reading member 23 so that front edge 27 of reading member 23 is fittingly engaged with upper section 22 when PCMCIA smart card reader 20 is fully assembled.

 Printed circuit board 24 includes conductors 34 located at one end, and connectors
20 36 positioned in a center portion of printed circuit board 24. Contact springs 38 located on reading member 23 come in contact with connectors 36 of printed circuit board 24 as reading member 23 is positioned on printed circuit board 24. At the same time, connectors

36 are in contact with conductors 34 to form an electrical connection between reading member 23 and printed circuit board 24. A female connecting portion 40 is located at a front end of printed circuit board 24 for connecting with an input/output connector, such as a telephone connector, which will be described later.

5 A front edge 42 of lower section 26 includes an upper surface 41, and defines a substantially rectangular cut-out portion 43. Female connecting portion 40 of printed circuit board 24 is inserted in cut-out portion 43 when PCMCIA smart card reader 20 is fully assembled.

10 Flanges 44 located at each corner of front edge 25 of upper section 22 extends downward and are inserted within corresponding slot portions 45 of lower section 26 to secure upper section 22 to lower section 26. As illustrated in FIG. 3, in a preferred embodiment of the present invention, flanges 44 are integral with upper section 22 and mechanically support upper section 22 at the front edge of PCMCIA smart card reader 20. An opening 46 is formed by flanges 44 and upper surface 41 of front edge 42 of lower
15 section 26. Opening 46 has a width extending between flanges 44 that is slightly larger than a smart card 48. For example, since smart card 48 typically has a width of 54.0 mm, according to a preferred embodiment of the present invention, the width of opening 46 is approximately equal to 55.0 mm. As a result, during an insertion of smart card 48 within PCMCIA smart card reader 20, smart card 48 is guided laterally by flanges 44.

20 Typically, PCMCIA smart card readers known in the art have a length L from front edge 25 to a back portion that is approximately equal to 85.5 mm. As illustrated in FIG. 2A, according to a preferred embodiment of the present invention, flanges 44 have a width

W that is approximately equal to 3 mm. Likewise, since smart cards known in the art are typically 54.0 mm wide, flanges 44 are preferably very thin so as to enable opening 46 to be approximately equal to the width of smart card 48. For example, according to a preferred embodiment of the present invention, flanges 44 have a thickness d_1 corresponding to a thickness d_2 of upper section 22, which in a preferred embodiment of the present invention is approximately equal to 0.2 mm. Thus, as illustrated in FIG. 2A, an inside width extending between inside portions 35 of flanges 44 is approximately equal to 54.2 mm and an outside width extending between outside portions 37 of flanges 44 is approximately equal to 54.6 mm.

As illustrated in FIGS. 2A and 4, contact springs 38 of reading member 23 extend toward front edge 27 of reading member 23 and are exposed along a bottom portion of reading member 23 to make contact with smart card 48 when smart card 48 is inserted within PCMCIA smart card reader 20. Since front edge 27 of reading member 23 is fittingly engaged with top section 22 when PCMCIA smart card reader 20 is fully assembled, contact springs 38 are located along top section 22, rather than lower section 26 of PCMCIA smart card reader 20. Contact springs 38 are soldered to printed circuit board 24 at soldering points 49 to electrically connect reading member 23 to printed circuit board 24. Tabs 50 (only one tab is shown) located at a back portion 52 of reading member 23 are inserted in corresponding holes 53 located on printed circuit board 24 to position and fasten reading member 23 onto printed circuit board 24.

By fittingly engaging front edge 27 of reading member 23 within inner portion 29 of upper section 22, contact springs 38 are located at upper section 22 of PCMCIA smart card

reader 20 rather than lower section 26. Positioning contact springs 38 towards front edge 27 of reading member 23 also decreases the distance that smart card 48 is required to be inserted within PCMCIA smart card reader 20 to make contact with contact springs 38, while at the same time back portion 52 limits the distance that smart card 48 can be inserted within PCMCIA smart card reader 20. Since smart card 48 comes in contact with contact springs 38 without having to be fully inserted within PCMCIA smart card reader 20, and since contact springs 38 are positioned along upper section 22 rather than lower section 26, additional space is created along printed circuit board 24 to enable additional electronic functions to be included in PCMCIA smart card reader 20.

The insertion of PCMCIA smart card reader 20 within an electronic device is illustrated in FIGS. 5A-5C. PCMCIA smart card reader 20 is inserted into a modem or card slot 54 that is located along a side portion of an outer case 55 of a portable or lap-top computer 56. When PCMCIA smart card reader 20 is fully inserted in card slot 54, conductors 34 come in contact with connectors (not shown) within portable computer 56 to provide an electrical connection between PCMCIA smart card reader 20 and card slot 54 of portable computer 56. PCMCIA smart card reader 20 is removed from card slot 54 by depressing an eject button 59 located within the vicinity of card slot 54 of portable computer 56.

As illustrated in FIGS 5B and 5C, as PCMCIA smart card reader 20 is inserted in card slot 54, PCMCIA smart card reader is guided by guides 58 located within card slot 54 of portable computer 56. As illustrated in FIG. 5B, a small amount of space 60 is typically left between guides 58 and an outer edge 62 of card slot 54 in order to allow outer case 55

of computer 54 to form the opening of card slot 54. This space between guides 58 and card slot 54 forms an inside lip 60 extending from outer edge 62 of card slot 54 to guides 58.

Therefore, as illustrated in FIG. 5C, by mechanically supporting upper section 22 and lower section 26 using the last 3 mm of the 85.5 mm length to form flanges 44, flanges 44 are positioned within inside lip 60. Since flanges 44 are located along outer edge 62 of card slot 54, flanges 44 immediately guide smart card 48 laterally upon insertion of smart card 48 within PCMCIA smart card reader 20, making insertion less difficult.

As illustrated in FIGS. 6A and 6B, in a second preferred embodiment of the present invention, a removable extension 61 is used to assist a user in locating opening 46 when inserting smart card 48 into PCMCIA smart card reader 20. Removable extension 61 is removably inserted within cut-out portion 43 of front edge 42 of lower section 26 of PCMCIA smart card reader 20. During transport of portable computer 56, or when no longer needed, removable extension 61 can easily be removed from portable computer 56 while smart card 48 is inserted within PCMCIA smart card reader 20 and PCMCIA smart card reader 20 is inserted within card slot 54. As a result, portable computer 54 can be transported while smart card 48 is inserted within portable computer 54 without being prone to damaging removable extension 61.

As illustrated in FIG. 6B, when removable extension 61 is inserted within PCMCIA smart card reader 20, a top portion 63 of removable extension 61 is aligned at opening 46 with upper surface 41 of front edge 42 of lower section 26. As a result, as illustrated FIG. 6A, removable extension 61 guides smart card 48 by aligning smart card 48 vertically

within opening 46, so that removable extension 61, in addition to flanges 44, make insertion of smart card 48 within PCMCIA smart card reader 20 less difficult.

As illustrated in FIGS. 7A and 7B, according to a further preferred embodiment of the present invention, removable extension 61 may be integrated with an input/output cable 64, such as a connector for a telephone line cable. Input/output cable 64 is inserted within female connecting portion 40 at the front end of printed circuit board 24 of PCMCIA smart card reader 20. As illustrated in FIG. 7B, when input/output cable 64 is inserted within PCMCIA smart card reader 20, a top portion 65 of input/output cable 64 is aligned with upper surface 41 of front edge 42 of lower section 26. As a result, as illustrated FIG. 7A, input/output cable 64 guides smart card 48 by aligning smart card 48 vertically within opening 46, so that input/output cable 64, in addition to flanges 44, make insertion of smart card 48 within PCMCIA smart card reader 20 less difficult.

Certain applications require the use of more than one input/output cable. As illustrated in FIGS. 8A and 8B, according to a further preferred embodiment of the present invention, removable extension 61 may be integrated with more than one input/output cable. For example, two input/output cables 66, such as two connectors for two separate telephone line cables may be used. Input/output cables 66 are inserted within corresponding female connecting portions (not shown) at the front end of printed circuit board 24 of PCMCIA smart card reader 20. As illustrated in FIG. 8B, when input/output cables 66 are inserted within PCMCIA smart card reader 20, a top portion 67 of input/output cables 67 is aligned with upper surface 41 of front edge 42 of lower section 26. As a result, as illustrated FIG. 8A, input/output cables 67 guide smart card 48 by

aligning smart card vertically within opening 46, so that input/output cables 66, in addition to flanges 44, make insertion of smart card 48 within PCMCIA smart card reader 20 less difficult.

5 Since input/output cable 64 and input/output cables 66 are normally removed by the user when portable computer 56 is transported, input/output cable 64 and input/output cables 66 act as a removable extension of PCMCIA smart card reader 20 which is easily and automatically removed during transport of portable computer 56 into which PCMCIA smart card reader 20 has been inserted for use. Since the extension is formed by input/output cable 64 or input/output cables 66, rather than by PCMCIA smart card reader
10 20, the extension does not protrude from outside card slot 54 of portable computer 56 during transport, and is therefore less prone to mechanical damage.

Although a few preferred embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the
15 scope of which is defined in the claims and their equivalents.

CLAIMS

What is claimed is

1 1. A smart card reading apparatus to fit inside a PCMCIA slot in a computing
2 device, comprising:
3 upper and lower sections having at a front end an opening to form a smart card slot
4 for insertion of a smart card; and
5 a lateral smart card guide member located close to the front end outside the smart
6 card slot, wherein the smart card reading apparatus is positionable substantially within the
7 PCMCIA slot with said lateral smart card guide member fitting between the front end of the
8 PCMCIA slot and the front end of a PCMCIA guide inside the PCMCIA slot.

1 2. A smart card reading apparatus according to claim 1, wherein said lateral
2 guide member is a mechanical support member connecting said upper and lower sections.

1 3. A smart card reading apparatus according to claim 2, wherein said lateral
2 guide member is integral with the upper section.

1 4. A smart card reading apparatus according to claim 2, comprising a
2 connecting part in the front end of said lower section to receive a removable extension to
3 said lower section.

1 5. A smart card reading apparatus according to claim 4, wherein said
2 connecting part includes electrical connectors, and said removable extension is a cable
3 connection.

1 6. A smart card reading apparatus according to claim 2, wherein electrical
2 contacts to interface with terminating points on a smart card inserted into said smart card
3 slot are arranged in said upper section.

1 7. A smart card reading apparatus according to claim 2, comprising circuits for
2 a communication device and circuits for smart card reading.

1 8. A smart card reading apparatus to fit inside a PCMCIA slot in a computing
2 device having an insertion opening for a PCMCIA card in front of a pair of parallel
3 PCMCIA guides located within the computing device and spaced apart to fit a standard
4 size PCMCIA card, the smart card reading apparatus comprising:
5 upper and lower sections having at a front end an opening to form a smart card slot for
6 insertion of a smart card having standard dimensions; and
7 a lateral smart card guide member located close to the front end of the smart card slot,
8 said lateral smart card guide member being equal to or shorter than the distance between
9 said insertion opening and said front end of said PCMCIA guides, whereby the lateral
10 smart card guide member is located in front of and outside said PCMCIA guides, and
11 the smart card reading apparatus can fit within the PCMCIA slot without interference
12 between said lateral smart card guide member and said pair of PCMCIA guides located
13 within the computing device.

1 9. A smart card reading apparatus to fit inside a PCMCIA slot in a computing
2 device having an insertion opening for a PCMCIA card in front of standard size PCMCIA
3 guides, comprising:
4 upper and lower sections having at a front end an opening to form a smart card slot
5 for insertion of a smart card; and
6 a lateral smart card guide member located close to the front end of the smart card
7 slot, said lateral smart card guide member being equal to or shorter than the distance

8 between said insertion opening and the front end of said PCMCIA guides.

1 10. A smart card reading apparatus according to claim 9, wherein said lateral
2 guide member is a mechanical support member connecting said upper and lower sections.

1 11. A smart card reading apparatus according to claim 10, wherein said lateral
2 guide member is integral with the upper section.

1 12. A smart card reading apparatus according to claim 9, further comprising a
2 connecting part in the front end of said lower section to receive a removable extension to
said lower section.

1 13. A smart card reading apparatus according to claim 12, wherein said
2 connecting part includes electrical connectors, and said removable extension is a cable
3 connection.

1 14. A smart card reading apparatus according to claim 10, wherein electrical
2 contacts to interface with terminating points on a smart card inserted into said smart card
3 slot are arranged in said upper section.

1 15. A smart card reading apparatus according to claim 10, further comprising
2 circuits for a communication device and circuits for smart card reading.

1 16. A smart card reading apparatus to fit inside a PCMCIA slot in a computing
2 device, comprising:
3 a thin upper section;
4 a lower section having electronic components for the smart card reader;
5 said upper and lower sections having at a front end an opening to form a smart card

6 slot for insertion of a smart card; and
7 interfacing means for communicating with a smart card inserted into said smart card
8 slot arranged in said thin upper section.

1 17. A smart card reading apparatus according to claim 16, further comprising a
2 smart card guide member located adjacent the front end outside the smart card slot and
3 positionable inside the PCMCIA slot.

1 18. A smart card reading apparatus according to claim 17, wherein said guide
2 member is a mechanical support member connecting said upper and lower sections.

1 19. A smart card reading apparatus according to claim 18, wherein said
2 mechanical support member is integral with the upper section.

1 20. A smart card reading apparatus according to claim 17, comprising a
2 connecting part in the front end of said lower section to receive a removable extension to
3 said lower section.

1 21. A smart card reading apparatus according to claim 20, wherein said
2 connecting parts include electrical connectors, and said removable extension is a cable
3 connection.

1 22. A smart card reading apparatus according to claim 16, comprising circuits
2 for a communication device and circuits for smart card reading.

1 23. A smart card reading apparatus to fit inside a PCMCIA slot in a computing
2 device, comprising:
3 upper and lower sections having at a front end an opening to form a smart card slot

4 for insertion of a smart card; and
5 a connecting part in the front end of said lower section to receive a removable
6 extension to support a smart card vertically during and after insertion in said smart card
7 slot.

1 24. A smart card reading apparatus according to claim 23, wherein said
2 connecting part includes electrical connectors, and said removable extension is a cable
3 connection.

1 25. A smart card reading apparatus according to claim 23, further comprising a
2 smart card guide member located adjacent the front end outside the smart card slot and
3 positionable inside the PCMCIA slot.

1 26. A smart card reading apparatus according to claim 25, wherein said guide
2 member is a mechanical support member connecting said upper and lower sections.

1 27. A smart card reading apparatus according to claim 26, wherein said guide
2 member is integral with the upper section.

1 28. A smart card reading apparatus according to claim 23, wherein interfacing
2 means for communicating with a smart card inserted into said smart card slot is arranged in
3 said upper section.

1 29. A smart card reading apparatus according to claim 23, comprising circuits
2 for a communication device and circuits for smart card reading.