(54) Title: ANTENNA FOR A PC CARD

(57) Abstract: An antenna for a PC card is provided. The antenna of the present invention includes a shaft, a hinge and a knob. The shaft has a first end and a second end where the hinge is disposed intermediate the first end and the second end of the antenna at an angle relative to the PC card. The knob, which is disposed at the second end of the shaft, includes a gripping surface for gripping by a user during deployment of the antenna. The gripping surface is disposed at the angle relative to the hinge such that as a user rotates the antenna during deployment, the antenna properly deploys.
ANTENNA FOR A PC CARD

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to antennas for PC cards and more specifically, to an antenna configured for controlled deployment from a PC card.

2. Description of Related Art

[0002] Today, users reliance on wireless communication continues to steadily increase. This reliance includes the use of wireless communication with mobile devices such as laptop computers and personal data assistants (PDA). These mobile devices have the ability to send and receive data, such as files, facsimiles or the like, using wireless PC cards, such as wireless modems.

[0003] The PC cards which send and receive data typically include an internal modem and an antenna which provide communication capability for the PC card. The modem includes the necessary components for allowing data transmission. The antenna facilitates data transmission by the modem to a remote device. During inoperation of the PC card, the antenna remains in an undeployed configuration within the PC card. When a user desires to use the PC card for data transmission, a user deploys the antenna prior to data transmission by the modem and the PC card. Deployment of the antenna improves the data transmission capabilities of the PC card.
A user deploys the antenna by gripping an exposed end of the antenna and pulling the antenna away from both the PC card and the device which uses the PC card. As the user pulls the antenna away from the PC card, the user rotates the antenna into a vertical direction relative to the PC card to enhance data transmission capabilities. The prior art antennas include a hinge which allows rotation of an end of the antenna into a vertical direction. Typically, the exposed end includes a tip having indentations which allow a user the ability to pull on the antenna. However, the configuration of the indentations relative to the hinge of the antenna does not ensure proper deployment of the antenna from the PC card. To further illustrate, a user may rotate the antennae in a direction opposite to a range of motion of the hinge of the antenna which allows rotation. As a result, damage may occur to both the antenna and the PC card. For example, rotating the antenna in a direction opposite to the hinge may bend the antenna, thereby precluding use of the antenna. In addition, improper rotation of the antenna relative to the hinge may cause detachment of the antenna from the PC card, thereby limiting data transmission by the PC card.

Therefore, a need exists for an antenna having a configuration which ensures proper deployment of the antenna during use of a PC card having the antenna. This new antenna should allow proper deployment of the antenna regardless of the way a user grips the antenna during deployment of the antenna.

**BRIEF SUMMARY OF THE INVENTION**

The present invention fills the aforementioned needs by providing an antenna configured to allow proper deployment from PC card using the antenna. The
configuration minimizes the possibility of damage to the antenna due to improper deployment of the antenna for data transmission by the PC card.

[0007] In one embodiment of the present invention, an antenna for a PC card is provided. The antenna includes a shaft having a first end and a second end; a hinge and a knob. The hinge is disposed intermediate the first end and the second end at an angle relative to the PC card. The knob, which is disposed at the second end of the shaft, includes a gripping surface, such as a dimple, for gripping by a user. The gripping surface is orientated at the angle relative to the hinge in order to allow proper deployment of the antenna during use of the PC card. The angle of the gripping surface relative to the hinge is such that as a user moves the knob via the gripping surface in a vertical direction with relation to the PC card, the antenna properly deploys.

[0008] In another embodiment of the present invention, an antenna assembly for a PC card is disclosed. The assembly includes a housing having a shaft, a hinge and a knob. The shaft within the housing includes a first end and a second end opposite the first end. The hinge, which is disposed intermediate the first end and the second end, is configured for rotating the second end of the antenna relative to the first end. In addition, the configuration of the hinge relative to the PC card allows for proper deployment of the antenna as a user rotates the second end of the antenna during antenna deployment. The assembly also includes a knob disposed about the second end of the antenna. The knob includes a gripping surface which is configured to allow a user to grip the surface during deployment of the antenna. The gripping surface is also disposed relative to the hinge such that as the user deploys the antenna, the antenna deploys in a proper configuration.
As may be appreciated, the present invention discloses a PC card antenna being configured to ensure proper deployment when a user desires to transmit data using the PC card. The configuration of the knob relative to the hinge and the PC card minimizes the possibility of damage to the antenna during deployment of the antenna.

**BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS**

Many advantages of the present invention will be apparent to those skilled in the art with a reading of this specification in conjunction with the attached drawings, wherein like reference numerals are applied to like elements and wherein:

- Figure 1 shows a schematic of an antenna for a PC card in accordance with one embodiment of the present invention.
- Figure 2 is an embodiment of the present invention where the antenna shown with respect to Figure 1 is in a stowed position within the PC card, also shown with reference to Figure 1.
- Figure 3 illustrates a schematic of an alternative embodiment of the present invention where a knob of the antenna shown with reference to Figure 1 has a bell configuration.
- Figure 4A is a schematic of an embodiment of the present invention illustrating the knob shown with reference to Figure 2.
- Figure 4B illustrates a schematic of the present invention showing the knob of Figure 4A during deployment of the antenna shown with reference to Figure 1.
- Figure 5 illustrates an alternative embodiment of the present invention where the antenna shown with reference to Figure 2 includes pins.
[0017] Figure 6 is a cross-sectional view of an antenna housing in accordance with one embodiment of the present invention.

**DETAILED DESCRIPTION OF THE INVENTION**

[0018] The present invention discloses an antenna for a PC card. As an overview, a configuration of an antenna in accordance with an embodiment of the present invention ensures proper deployment of the antenna during use of a PC card using the antenna for data transmission. The antenna includes a hinge disposed at an angle relative to the PC card. A gripping surface of the antenna is orientated at the angle relative to a hinge of the antenna. As will be discussed in greater detail with respect to the accompanying Figures, as a user grips and moves the gripping surface and the antenna, the orientation of the gripping surface relative to the hinge ensures proper deployment of the antenna.

[0019] Now making reference to the Figures, and more particularly to Figure 1, Figure 1 shows a schematic of an antenna 100 for a PC card 120, in accordance with one embodiment of the present invention. As may be seen with reference to the Figure, the antenna 100 is in a deployed position such that the PC card 120 may send and receive data. When the antenna is in the deployed position as shown, the antenna maximizes data transmission by the PC card 120. When the PC card 120 is not transmitting data, the antenna 100 is in a undeployed position, as shown with reference to Figure 2.

[0020] Figure 2 is an embodiment of the present invention illustrating a schematic side view of the antenna 102 where the antenna 100 is stowed within the PC
card 120 shown with reference to Figure 1. As may be seen with reference to the
Figure, the antenna 100 includes a knob 102, a dimple 104 within the knob 102, a first
end 110 and a second end 106. In this embodiment, the PC card 120 may be any PC
card having data transmission capabilities in a wireless environment, such as Type II
unextended PC card, a Type II extended PC card, or the like. The knob 102 protrudes
from the PC card 120 during stowage of the antenna 100. When a user desires to
transmit data using the PC card 120, the user must first deploy the antenna 100. The
user deploys the antenna 100 by pulling the knob 102 at the dimple 104 in a direction
indicated by directional arrow Z. The dimple 104 may be any gripping surface which
allows a user to grip the antenna 100, such as an indented surface within the knob 102, a
serrated surface or the like. Likewise, the knob 102 may have a contoured configuration
as shown with reference to Figure 3. In the embodiment shown with reference to Figure
3, the knob 102 includes a concavity 102a disposed about the periphery of the knob 102
to form the contoured configuration. Therefore, as a user deploys the antenna, the user
grips the knob 102 of the antenna 100 about the concavity 102a.

[0021] Returning to Figure 2 and the antenna 100, a user pulls on the knob 102
until a surface 112a of an end 112 of the antenna contacts a surface 120a of the PC card
120. Once the surface 112a contacts the surface 120a, the user moves the knob 102 in
upward direction indicated by directional arrow X. When the user moves the knob 102
as indicated by the directional arrow X, the antenna moves into the deployed position
shown with reference to Figure 1. The antenna 100 moves into the deployed position
with a hinge 114 having a pin 108. During operation, the hinge 114 rotates about the
pin 108, thereby allowing deployment of the antenna 100 into the deployed position.
The antenna moves into the configuration shown with reference to Figure 1 since the pin 108 is disposed at a given angle relative to the PC card 120, as shown in greater detail with reference to Figure 4A.

[0022] Figure 4A is a schematic back view of the antenna 100 shown with reference to Figure 2 in accordance with an embodiment of the present invention. As may be seen with reference to the Figure, the pin 108 disposes at an angle B relative to the PC card 120. In one embodiment of the present invention, the angle B is preferably in a range between about 5 degrees and about 85 degrees, more preferably in a range between about 25 degrees and about 65 degrees and most preferably about 45 degrees. When a user moves the knub 102 in the direction indicated by the directional arrow X, the antenna 100 and the knub 102 rotate in a direction indicated by directional arrow Y. As the antenna 100 rotates in the direction indicated by the directional arrow Y, the antenna 100 deploys into the proper position shown with reference to Figure 1. It should be understood that when the knub 102 has the configuration shown with reference to Figure 3, as a user moves the knub 102 in a direction indicated by the directional arrow X, the knub 102 rotates in the direction indicated by the directional arrow Y, again ensuring proper deployment of the antenna 100. The antenna rotates as indicated by the directional arrow Y until the pin 108 is in the proper orientation as shown with reference to Figure 4B. As may be seen with reference to Figure 4B, the pin 108 is in the proper orientation when the pin 108 is parallel to the PC card 120. It should be noted that the pin 108 forms a portion of the hinge 114, therefore the hinge 114 is also disposed at the angle B relative to the PC card 120. In addition, the hinge 114 is parallel to the PC card 120 when the pin 108 is in the proper orientation. Upon
orientation of the hinge 114 and the pin 108 as shown with reference to Figure 4B, the antenna 100 deploys into the position shown with reference to Figure 1.

[0023] Now turning attention to Figure 5, Figure 5 illustrates an alternative embodiment of the present invention where the antenna 100 shown with reference to Figure 2 includes pins 116 within an assembly 122. The pins 116 are disposed about a periphery of the first end 110 of the antenna 100 such that the pins 116 control rotation of the antenna 100 as a user pulls on the knob 102. The pins 116 control the rotation of the antenna 100 by traveling through a guide 118a of an antenna housing 118, as shown with reference to Figure 6. Figure 6 is a cross-sectional view of the antenna housing 118 shown with reference to Figure 2 in accordance with one embodiment of the present invention. As may be seen with reference to Figure 6, the guide 118a is a groove radially disposed within an inner wall 118b of the antenna housing 118. As a user deploys the antenna 100 by pulling on the knob 102, the pins 116 travel through the guide 118a, thereby rotating the antenna 100 and the hinge 114 along with the pin 108 into the orientation for deployment as shown with reference to Figure 4B. Once the antenna 100 is in the proper orientation for deployment, the pins 116 travel within guide portion 118a-1 of the guide 118 in order to maintain the orientation. The guide portion 118a-1 maintains the proper orientation until the surface 112a of the antenna 100 contacts the surface 120a of the PC card 120, whereby the antenna 100 deploys into the position shown with reference to Figure 1, as previously described.

[0024] As may be appreciated, the present invention provides an antenna configured to ensure proper deployment from a PC card. The present invention avoids the problems of the prior art since a user is precluded from bending the antenna in a
direction opposite a hinge of the antenna. As previously discussed, bending of prior art antennas increased the possibility of detachment of the antenna from the PC card. As such, overall reliability of a PC card using the present invention increases.

[0025] The above are exemplary modes of carrying out the invention and are not intended to be limited. It will be apparent to those of ordinary skill in the art that modifications thereto can be made without departure from the spirit and scope of the invention as set forth in the accompanying claims.
CLAIMS

1. An antenna for a PC card, the antenna comprising:

   a shaft having a first end and a second end;
   a hinge disposed intermediate the first end and the second end at an angle relative to the PC card;
   a knob disposed at the second end of the shaft, the knob having at least one gripping surface for gripping by a user, the gripping surface being orientated at the angle relative to the hinge such that upon movement of the knob, the angle causes rotation of the shaft into a proper position for deployment.

2. An antenna as recited in claim 1, wherein the angle is 45 degrees.

3. An antenna as recited in claim 1, wherein the gripping surface has a contoured configuration.

4. An antenna as recited in claim 1, wherein the gripping surface is a dimple formed within the knob.

5. An antenna as recited in claim 1, wherein the antenna deploys properly when the antenna is an orientation which allows maximum data transmission by the PC card.

6. An antenna assembly for a PC card, the antenna assembly comprising:
a housing having a guide radially disposed within an inner wall of the housing,
the guide being configured to rotate a shaft as a user pulls the shaft from within the
housing, the shaft having a first end and a second end;

a hinge disposed intermediate the first end and the second end of the shaft, the
hinge being configured for rotating the second end of the antenna relative to the first end
of the antenna for proper deployment of the antenna; and

a knob disposed about the second end of the antenna, the knob including a
gripping surface, the gripping surface being configured to allow the user to grip the
surface for deployment of the antenna, the gripping surface being disposed relative to
the hinge such that as the user deploys the antenna, the antenna deploys in a proper
configuration.

7. An antenna as recited in claim 6, wherein the antenna deploys in a proper
configuration when the antenna is an orientation which allows maximum data
transmission by the PC card.

8. An antenna as recited in claim 6, wherein the gripping surface is a knob
formed within the knob.

9. An antenna as recited in claim 6, wherein the gripping surface has a
contoured configuration.

10. An antenna as recited in claim 1, the shaft farther comprising:
pins radially disposed about the shaft, the pins being configured for engagement with the guide of the housing such that as the user pulls the shaft from the housing, the shaft rotates as the pins engage with the guide.

11. An antenna for a PC card the antenna comprising:

a housing having a shaft, the shaft including a first end and a second end opposite the first end the shaft being disposed within the housing;

a hinge disposed intermediate the first end and the second end, the hinge being configured for rotating the second end of the antenna relative to the first end of the antenna for proper deployment of the antenna; and

a knob disposed about the second end of the antenna, the knob including a gripping surface, the gripping surface, the gripping surface being configured to allow a user to grip the surface for deployment of the antenna, the gripping surface being disposed relative to the hinge such that as the user deploys the antenna, the antenna deploys in a proper configuration.

12. An antenna as recited in a claim 11, wherein the housing includes a guide radically disposed within an inner wall of the housing, the guide being configured to rotate the shaft of the antenna as the user pulls the shaft from within the housing.

13. An antenna as recited in claim 12, the shaft further comprising:
pins radially disposed about the shaft, the pins being configured for engagement with the guide of the housing such that as the user pulls the shaft from the housing, the shaft rotates as the pins engage with the guide.

14. An antenna as recited in claim 11, wherein the knub is disposed at an angle relative to the hinge.

15. An antenna as recited in claim 14, wherein the hinge is disposed at the angle relative to the housing.

16. An antenna as recited in claim 15, wherein the angle allows proper deployment of the antenna from the PC card.

17. An antenna as recited in claim 16, wherein the angle is 45 degrees.
Figure 48