User Manual for the AirPrime PC3200P- version 0.4 (07/17/02)

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Getting the Most Out of Your Reception

Keeping Tabs on Signal Strength

The quality of each call you make or receive depends on the signal strength in your area. Your PC card used with a laptop computer informs you of the current signal strength by displaying a number of bars next to the signal strength icon. The more bars displayed, the stronger the signal. If you're inside a building, being near a window may give you better reception.

Understanding the Power Save Feature

If your PC card is unable to find a signal after 15 minutes of searching, a Power Save feature is automatically activated. If your PC card is active, it periodically rechecks service availability or you can check it yourself by pressing any key. Anytime the Power Save feature is activated, a message displays on the screen. When a signal is found, your PC card returns to Standby mode.

Understanding How Your PC card Operates

Your PC card is basically a radio transmitter and receiver. When it's turned on, it receives and transmits radio frequency (RF) signals. When you use your PC card, the system handling your call controls the power level. This power can range from 0.006 watts to 1 watts in digital mode.

Knowing Radio frequency Safety

The design of your PCS PC card complies with updated NCRP standards described below.

In 1991-92, the Institute of Electrical and Electronics Engineers (IEEE) and the American National Standards Institute (ANSI) joined in updating ANSI's 1982 standard for safety levels with respect to human exposure to RF signals. More than 120 scientists, engineers and physicians from universities, government health agencies and industries developed this updated standard after reviewing the available body of research. In 1993, the Federal Communications Commission (FCC) adopted this updated standard in a regulation. In August 1996, the FCC adopted hybrid standard consisting of the existing ANSI / IEEE standard and the guidelines published by the National Council of Radiation Protection and Measurements (NCRP).

Maintaining Your PC card's Peak Performance

There are several simple guidelines to operating your PC card properly and maintaining safe, satisfactory service.

- Use your PC card with the antenna raised, fully-extended pointing up. Try not to hold, bend or twist the PC card's antenna.
- Don't use the PC card if the antenna is damaged.
- Avoid exposing your PC card to rain or liquid spills. If your PC card does get wet, immediately turn the power off. If it's inoperable, return it to a Sprint Store or call PCS Customer Solutions for service.

Note: For the best care of your PC card, only Sprint authorized personnel should service your PC card. Faulty service may void
the warranty.

Maintaining Safe Use of and Access to Your PC Card

FAILURE TO FOLLOW THE INSTRUCTIONS OUTLINED MAY LEAD TO SERIOUS PERSONAL INJURY AND POSSIBLE PROPERTY DAMAGE

Using Your PC card While Driving

- Using your PC card while driving is not recommended and is prohibited in some jurisdictions. Laws vary as to specific restrictions. Remember that safety always comes first.
- When using your PC card in the car, pull over to the side of the road and park safely before utilizing your PC card.

Following Safety Guidelines

To operate your PC card safely and efficiently, always follow any special regulations in a given area. Turn your PC card off in areas where use is forbidden or when it may cause interference or danger.

Using Your PC card Near Other Electronic Devices

- Most modern electronic equipment is shielded from radio frequency (RF) signals. However, RF signals from wireless PC cards may affect inadequately shielded electronic equipment.
- RF signals may affect improperly installed or inadequately shielded electronic operating systems and / or entertainment systems in motor vehicles. Check with the manufacturer or their representative to determine if these systems are adequately shielded from external RF signals. Also check with the manufacturer regarding any equipment that has been added to your vehicle.
- Consult the manufacturer of any personal medical devices, such as pacemakers and hearing aids, to determine if they are adequately shielded from external RF signals.

Note: Always turn off the PC card in health care facilities and request permission before using the PC card near medical equipment.

Turning Off Your PC card Before Flying

- Turn off your PC card before boarding any aircraft. To prevent possible interference with aircraft systems, the U.S. Federal Aviation Administration (FAA) regulations require you to have permission from a crewmember to use your PC card while the plane is on the ground. To prevent any risk of interference, FCC regulations prohibit using your PC card while the plane is in the air.

Turning Off Your PC card in Dangerous Areas

- To avoid interfering with blasting operations, turn off your PC card when in a blasting area or in other areas with signs indicating that two-way radios should be turned off. Construction crews often use remote-control RF devices to set off explosives.
- Turn off your PC card when you're in any area that has a potentially explosive atmosphere. Although it's rare, your PC card or its accessories could generate sparks. Sparks could cause an explosion or a fire resulting in bodily injury or even death. These areas are often, but not always, clearly marked. They include:
- Fueling areas such as gas stations.
- Below deck on boats.

- Fuel or chemical transfer or storage facilities.
- Areas where the air contains chemicals or particles such as grain, just or metal powders.
- Any other area where you would normally be advised to turn off your vehicle's engine.

Vehicles using liquefied petroleum gas (such as propane or butane) must comply with the National Fire Protection Standard (NFPA-58). For a copy of this standard, contact the National Fire Protection Association, One Batterymarch Park, Quincy, MA 02269, Attn: Publication Sales Division.

Note: Never transport or store flammable gas, liquid or explosives in the compartment of your vehicle that contains your PC card or accessories.

Restricting Children's Access to your PC card

- Your PCS PC card is not a toy. Children should not be allowed to play with it because they could hurt themselves and others, damage the PC card or make calls that increase your PC card bill.

Acknowledging Special Precautions and the FCC Notice

FCC Notice

The PC card may cause TV or radio interference if used in close proximity to receiving equipment. The FCC can require you to stop using the PC card if such interference cannot be eliminated.

Cautions

Any changes or modifications to your PC card not expressly approved in this document could void your warranty for this equipment, and void your authority to operate this equipment. The use of any unauthorized accessories may be dangerous and void the PC card warranty if said accessories cause damage or a defect to the PC card.

Although your PC card is quite sturdy, it is a complex piece of equipment and can be broken. Avoid dropping, hitting, bending or sitting on it.

PC Card Operation

To maintain compliance with FCC RF exposure guidelines, ensure the antenna is at least one inch (2.5 centimeters) from any part of your body and/or any bystander when transmitting. Use of non-Sprint approved accessories may violate FCC RF exposure guidelines.

For more information about RF exposure, please visit the FCC Web site at http://www.fcc.gov/.

Specific Absorption Rates (SAR) for Wireless PC Cards

The SAR is a value that corresponds to the relative amount of RF energy absorbed in the head and/or body of a user of a wireless device such as a wireless PC Card.

The SAR value of a PC card is the result of an extensive testing, measuring and calculation process. It does not represent how much RF the PC card emits. All PC card models are tested at their highest value in strict laboratory settings. But when in operation, the SAR of a PC card can be substantially less than the level reported to the FCC. This is because of a variety of factors including its proximity to a base station antenna, PC card design and

other factors. What is important to remember is that each PC card meets strict federal guidelines. Variations in SAR does not represent a variation in safety.

All PC cards must meet the federal standard, which incorporates a substantial margin of safety. As stated above, variations in SAR values between different model PC cards do not mean variations in safety. The FCC considers a SAR value at or below 1.6 W/kg safe for public use.

The highest reported SAR values of the Sapphire **PC3200P** are:

- PCS mode (Part 24)- Separation distance of 1 inch (2.5 centimeters) to near by persons: 0.853 W/kg.
- PCS mode (Part 24)- Separation distance of 1 inch (2.5 centimeters) to the user: 0.219 W/kg.

FCC Radio frequency Emission

This PC card meets the FCC Radio frequency Emission Guidelines. FCC ID number: **PNF-PC3200P.** More information on the PC card's SAR can be found from the following FCC Web site: http://www.fcc.gov/oet/fccid.

Consumer Information on Wireless PC cards

(The following information comes from a consumer information
Web site jointly sponsored by the U.S. Food and Drug Administration (FDA) and the Federal Communications Commission (FCC), entitled "Cell PC card Facts: Consumer Information on Wireless PC cards." The information reproduced herein is dated April 3, 2002. For further updates, please visit the Web site: http://www.fda.gov/cellphones.

What is radio frequency energy (RF)?

Radio frequency (RF) energy is another name for radio waves. It is one form of electromagnetic energy that makes up the electromagnetic spectrum. Some of the other forms of energy in the electromagnetic spectrum are gamma rays, x-rays and light. Electromagnetic energy (or electromagnetic radiation) consists of waves of electric and magnetic energy moving together (radiating) through space. The area where these waves are found is called an electromagnetic field.

Radio waves are created due to the movement of electrical charges in antennas. As they are created, these waves radiate away from the antenna. All electromagnetic waves travel at the speed of light. The major differences between the different types of waves are the distances covered by one cycle of the wave and the number of waves that pass a certain point during a set time period. The wavelength is the distance covered by one cycle of a wave. The frequency is the number of waves passing a given point in one second. For any electromagnetic wave, the wavelength multiplied by the frequency equals the speed of light. The frequency of an RF signal is usually expressed in units called hertz (Hz). One Hz equals one wave per second. One kilohertz (kHz) equals one thousand waves per second, one megahertz (MHz) equals one million waves per second, and one gigahertz (GHz) equals one billion waves per second.

RF energy includes waves with frequencies ranging from about 3000 waves per second (3 kHz) to 300 billion waves per second (300 GHz). Microwaves are a subset of radio waves that have frequencies ranging from around 300 million waves per second (300 MHz) to three billion waves per second (3 GHz).

How is radio frequency energy used?

Probably the most important use of RF energy is for telecommunications. Radio and TV broadcasting, wireless PC cards, pagers, cordless PC cards, police and fire department radios, point-to-point links and satellite communications all rely on RF energy.

Other uses of RF energy include microwave ovens, radar, industrial heaters and sealers, and medical treatments. RF energy, especially at microwave frequencies, can heat water. Since most food has a high water content, microwaves can cook food quickly. Radar relies on RF energy to track cars and airplanes as well as for military applications. Industrial heaters and sealers use RF energy to mold plastic materials, glue wood products, seal leather items such as shoes and pocketbooks, and process food. Medical uses of RF energy include pacemaker monitoring and programming.

How is radio frequency radiation measured?

RF waves and RF fields have both electrical and magnetic components. It is often convenient to express the strength of the RF field in terms of each component. For example, the unit "volts per meter" (V/m) is used to measure the electric field strength, and the unit "amperes per meter" (A/ m) is used to express the magnetic field strength. Another common way to characterize an RF field is by means of the power density. Power density is defined as power per unit area. For example, power density can be expressed in terms of milliwatts (one thousandth of a watt) per square centimeter (mW/cm2 or microwatts (one millionth of a watt) per square centimeter (µW/cm2).

The quantity used to measure how much RF energy is actually absorbed by the body is called the Specific Absorption Rate or SAR. The SAR is a measure of the rate of absorption of RF energy. It is usually expressed in units of watts per kilogram (W/kg) or milliwatts per gram (mW/g).

What biological effects can be caused by RF energy?

The biological effects of radio frequency energy should not be confused with the effects from other types of electromagnetic energy.

Very high levels of electromagnetic energy, such as is found in X-rays and gamma rays can ionize biological tissues. Ionization is a process where electrons are stripped away from their normal locations in atoms and molecules. It can permanently damage biological tissues including DNA, the genetic material. Ionization only occurs with very high levels of electromagnetic energy such as X-rays and gamma rays. Often the term radiation is used when discussing ionizing radiation (such as that associated with nuclear power plants).

The energy levels associated with radio frequency energy, including both radio waves and microwaves, are not great enough to cause the ionization of atoms and molecules. Therefore, RF energy is a type of non-ionizing radiation. Other types of non-ionizing radiation include visible light, infrared radiation (heat) and other forms of electromagnetic radiation with relatively low frequencies.

Large amounts of RF energy can heat tissue. This can damage tissues and increase body temperatures. Two areas of the body, the eyes and the testes, are particularly vulnerable to RF heating because there is relatively little blood flow in them to carry away excess heat.

The amount of RF radiation routinely encountered by the general public is too low to produce significant heating or increased body temperature. Still, some people have questions about the possible health effects of low levels of RF energy. It is generally agreed that further research is needed to determine what effects actually occur and whether they are dangerous to people. In the meantime, standards-setting organizations and government agencies are continuing to monitor the latest scientific findings to determine whether changes in safety limits are needed to protect human health.

FDA, EPA and other US government agencies responsible for public health and safety have worked together and in connection with WHO to monitor developments and identify research needs related to RF biological effects.

What levels of RF energy are considered safe?

Various organizations and countries have developed standards for exposure to radio frequency energy. These standards recommend safe levels of exposure for both the general public and for workers. In the United States, the FCC has used safety guidelines for RF environmental exposure since 1985.

The FCC guidelines for human exposure to RF electromagnetic fields are derived from the recommendations of two expert organizations, the National Council on Radiation Protection and Measurements (NCRP) and the Institute of Electrical and Electronics Engineers (IEEE). In both cases, the recommendations were developed by scientific and engineering experts drawn from industry, government, and academia after extensive reviews of the scientific literature related to the biological effects of RF energy.

Many countries in Europe and elsewhere use exposure guidelines developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The ICNIRP safety limits are generally similar to those of the NCRP and IEEE, with a few exceptions. For example, ICNIRP recommends different exposure levels in the lower and upper frequency ranges and for localized exposure from certain products such as hand-held wireless PC cards. Currently, the World Health Organization is working to provide a framework for international harmonization of RF safety standards.

The NCRP, IEEE, and ICNIRP all have identified a whole-body Specific Absorption Rate (SAR) value of 4 watts per kilogram (4 W / kg) as a threshold level of exposure at which harmful biological effects may occur. Exposure guidelines in terms of field strength, power density and localized SAR were then derived from this threshold value. In addition, the NCRP, IEEE, and ICNIRP guidelines vary depending on the frequency of the RF exposure. This is due to the finding that whole-body human absorption of RF energy varies with the frequency of the RF signal. The most restrictive limits on whole-body exposure are in the frequency range of 30-300 MHz where the human body absorbs RF energy most efficiently. For products that only expose part of the body, such as wireless PC cards, exposure limits in terms of SAR only are specified.

The exposure limits used by the FCC are expressed in terms of SAR, electric and magnetic field strength, and power density for transmitters operating at frequencies from 300 kHz to 100 GHz. The specific values can be found in two FCC bulletins, OET Bulletins 56 and 65:

http://www.fcc.gov/oet/info/documents/bulletins/ - 56;
http://www.fcc.gov/oet/info/documents/bulletins/ - 65

Why has the FCC adopted guidelines for RF exposure?

The FCC authorizes and licenses products, transmitters, and facilities that generate RF and microwave radiation. It has jurisdiction over all transmitting services in the U.S. except those specifically operated by the Federal Government. While the FCC does not have the expertise to determine radiation exposure guidelines on its own, it does have the expertise and authority to recognize and adopt technically sound standards promulgated by other expert agencies and organizations, and has done so . (Our joint efforts with the FDA in developing this website is illustrative of the kind of inter-agency efforts and consultation we engage in regarding this health and safety issue.)

Under the National Environmental Policy Act of 1969 (NEPA), the FCC has certain responsibilities to consider whether its actions will significantly affect the quality of the human environment. Therefore, FCC approval and licensing of transmitters and facilities must be evaluated for significant impact on the environment. Human exposure to RF radiation emitted by FCC-regulated transmitters is one of several factors that must be considered in such environmental evaluations. In 1996, the FCC revised its guidelines for

RF exposure as a result of a multi-year proceeding and as required by the Telecommunications Act of 1996.

Radio and television broadcast stations, satellite-earth stations, experimental radio stations and certain wireless communication facilities are required to undergo routine evaluation for RF compliance when they submit an application to the FCC for construction or modification of a transmitting facility or renewal of a license. Failure to comply with the FCC's RF exposure guidelines could lead to the preparation of a formal Environmental Assessment, possible Environmental Impact Statement and eventual rejection of an application. Technical guidelines for evaluating compliance with the FCC RF safety requirements can be found in the FCC's OET Bulletin 65.
http://www.fcc.gov/oet/info/documents/bulletins/#65

Low-powered, intermittent, or inaccessible RF transmitters and facilities are normally excluded from the requirement for routine evaluation for RF exposure. These exclusions are based on standard calculations and measurement data indicating that a transmitting station or equipment operating under the conditions prescribed is unlikely to cause exposures in excess of the guidelines under normal conditions of use. Such exclusions are not exclusions from compliance, but, rather, exclusions from routine evaluation. The FCC's policies on RF exposure and categorical exclusion can be found in Section 1.1307(b) of the FCC's Rules and Regulations [(47 CFR 1.1307(b)].

How can I obtain the Specific Absorption Rate (SAR) value for my wireless PC card?

The FCC requires that wireless PC cards sold in the United States demonstrate compliance with human exposure limits adopted by the FCC in 1996. The relative amount of RF energy absorbed in the head and/or body of a wireless PC card-user is given by the Specific Absorption Rate (SAR), as explained above. The FCC requires wireless PC cards to comply with a safety limit of 1.6 watts per kilogram (1.6 W/kg) in terms of SAR.

Information on SAR for a specific PC card model can be obtained for many recently manufactured PC cards using the FCC identification (ID) number for that model. The FCC ID number is usually printed somewhere on the case of the PC card. Once you have the ID number, go to the following Web address: www.fcc.gov/oet/fccid. On this page, you will see instructions for entering the FCC ID number. Type the FCC ID number exactly as requested (the Grantee Code is the first three characters, the Equipment Product Code is the rest of the FCC ID number). Then click on "Start Search." The "Grant of Equipment Authorization" for your PC card should appear. Read through the grant for the section on "SAR Compliance," "Certification of Compliance with FCC Rules for RF Exposure" or similar language. This section should contain the value(s) for typical or maximum SAR for your PC card.

PC cards and other products authorized since June 2, 2000, should have the maximum SAR levels noted directly on the "Grant of Equipment Authorization." For PC cards and products authorized between about mid-1998 and June 2000, detailed information on SAR levels is typically found in the exhibits associated with the grant. Once a grant is accessed, the exhibits can be viewed by clicking on "View Exhibit." Grants authorized prior to 1998 are not part of the electronic database but, rather, have been documented in the form of paper records.

The FCC database does not list PC cards by model number. However, consumers may find SAR information from other sources as well. Some wireless PC card manufacturers make SAR information available on their own Web sites. In addition, some non-government Web sites provide SARs for specific models of wireless PC cards. However, the FCC has not reviewed these sites and makes no guarantees of their accuracy. Finally, PC cards

certified by the Cellular Telecommunications and Internet Association (CTIA) are required to provide SAR information to consumers in the instructional materials that come with the PC cards.

What are wireless base stations?

Fixed antennas used for wireless telecommunications are referred to as cellular base stations, cell stations, PCS ("Personal Communications Service") stations or transmission towers. These base stations consist of antennas and electronic equipment. Because the antennas

need to be high in the air, they are often located on towers, poles, water tanks, or rooftops. Typical heights for freestanding base station towers are 50-200 feet.

Some base stations use antennas that look like poles, 10 to 15 feet in length, that are referred to as "omni-directional" antennas. These types of antennas are usually found in rural areas. In urban and suburban areas, wireless providers now more commonly use panel or sector antennas for their base stations. These antennas consist of rectangular panels, about 1 by 4 feet in dimension. The antennas are usually arranged in three groups of three antennas each. One antenna in each group is used to transmit signals to wireless PC cards, and the other two antennas in each group are used to receive signals from wireless PC cards.

At any base station site, the amount of RF energy produced depends on the number of radio channels (transmitters) per antenna and the power of each transmitter. Typically, 21 channels per antenna sector are available. For a typical cell site using sector antennas, each of the three transmitting antennas could be connected to up to 21 transmitters for a total of 63 transmitters. However, it is unlikely that all of the transmitters would be transmitting at the same time. When omni-directional antennas are used, a cellular base station could theoretically use up to 96 transmitters, but this would be very unusual, and, once again, it is unlikely that all transmitters would be in operation simultaneously. Base stations used for PCS communications generally require fewer transmitters than those used for cellular radio transmissions, since PCS carriers usually have a higher density of base station antenna sites.

Are wireless base stations safe?

The electromagnetic RF signals transmitted from base station antennas stations travel toward the horizon in relatively narrow paths. For example, the radiation pattern for an antenna array mounted on a tower can be likened to a thin pancake centered around the antenna system. The individual pattern for a single array of sector antennas is wedge-shaped, like a piece of pie. As with all forms of electromagnetic energy, the power decreases rapidly as one moves away from the antenna. Therefore, RF exposure on the ground is much less than exposure very close to the antenna and in the path of the transmitted radio signal. In fact, ground-level exposure from such antennas is typically thousands of times less than the exposure levels recommended as safe by expert organizations. So exposure to nearby residents would be well within safety margins.

Cellular and PCS base stations in the United States are required to comply with limits for exposure recommended by expert organizations and endorsed by government agencies responsible for health and safety. Measurements made near cellular and PCS base station antennas mounted on towers have confirmed that ground-level exposures are typically thousands of times less than the exposure limits adopted by the FCC. In fact, in order to be exposed to levels at or near the FCC limits for cellular or PCS frequencies an individual would essentially have to remain in the main transmitted radio signal (at the height of the antenna) and within a few feet from the antenna. This is, of course, very unlikely to occur.

When cellular and PCS antennas are mounted on rooftops, RF levels on that roof or on others near by would probably be greater than those typically encountered on the ground. However, exposure levels approaching or exceeding safety guidelines should be encountered only very close to or directly in front of the antennas. In addition, for sector-type antennas, typically used for such rooftop base stations, RF levels to the side and in back of these antennas are insignificant. General guidelines on antenna installations and circumstances that might give rise to a concern about an facility's conformance with FCC regulations can be found in A Local Government Official's Guide to Transmitting Antenna RF Emission Safety: Rules, Procedures, and Practical Guidance. This Guide can be accessed at: http://www.fcc.gov/oet/rfsafety.

Does the FCC routinely monitor radio frequency radiation from antennas?

The FCC does not have the resources or the personnel to routinely monitor the emissions for all the thousands of transmitters that are subject to FCC jurisdiction. However, the FCC does have measurement instrumentation for evaluating RF levels in areas that may be accessible to the public or to workers. If there is evidence for potential non-compliance with FCC exposure guidelines for a FCC-regulated facility, staff from the FCC's Office of Engineering and Technology or the FCC Enforcement Bureau can conduct and investigation, and, if appropriate, perform actual measurements. Circumstances that could give rise to a concern about an facility's conformance with FCC regulations can be found in A Local Government Official's Guide to Transmitting Antenna RF Emission Safety: Rules, Procedures, and Practical Guidance. This Guide can be accessed at: http://www.fcc.gov/oet/rfsafety. Potential exposure problems should be brought to the FCC's attention by contacting the FCC RF Safety Program at: 202-418-2464 or by e-mail: rfsafety@fcc.gov.

Does the FCC maintain a database that includes information on the location and technical parameters of all the transmitting towers it regulates?

Each of the FCC Bureaus maintains its own licensing database system for the service(s) it regulates (e.g., television, cellular service, satellite earth stations.) The FCC issues two types of licenses: site specific and market based. In the case of site specific licensed facilities, technical operating information is collected from the licensee as part of the licensing process. However, in the case of market based licensing (e.g., PCS, cellular), the licensee is granted the authority to operate a radio communications system in a geographic area using as many facilities as are required, and the licensee is not required to provide the FCC with specific location and operating parameters of these facilities.

Information on site specific licensed facilities can be found in the "General Menu Reports" (GenMen) at

http://gullfoss2.fcc.gov/cgi-bin/ws.exe/genmen/index.hts.

The various FCC Bureaus also publish on at least a weekly basis, bulk extracts of their licensing databases. Each licensing database has its own unique file structure. These extracts consist of multiple, very large files. The FCC's Office of Engineering and Technology (OET) maintains an index to these databases at http://www.fcc.gov/oet/info/database/ fadb.html. Entry points into the various databases include frequency, state/county, latitude/longitude, call-sign and licensee name. For further information on the Commission's existing databases, you can contact Donald Campbell at dcampbel@fcc.gov or 202-418-2405.

Can local and state governmental bodies establish limits for RF exposure?

Although some local and state governments have enacted rules and regulations about human exposure to RF energy in the past, the Telecommunications Act of 1996 requires the Federal Government to control human exposure to RF emissions. In particular, Section 704

of the Act states that, "No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions." Further information on federal authority and FCC policy is available in a fact sheet from the FCC's Wireless Telecommunications Bureau at www.fcc.gov/wtb.

Do wireless PC cards pose a health hazard?

The available scientific evidence does not show that any health problems are associated with using wireless PC cards. There is no proof, however, that wireless PC cards are absolutely safe. Wireless PC cards emit low levels of radio frequency energy (RF) in the microwave range while being used. They also emit very low levels of RF when in the stand-by mode. Whereas high levels of RF can produce health effects (by heating tissue), exposure to low level RF that does not produce heating effects causes no known adverse health effects. Many studies of low level RF exposures have not found any biological effects. Some studies have suggested that some biological effects may occur, but such findings have not been confirmed by additional research. In some cases, other researchers have had difficulty in reproducing those studies, or in determining the reasons for inconsistent results.

What is FDA's role concerning the safety of wireless PC cards?

Under the law, FDA does not review the safety of radiation-emitting consumer products such as wireless PC cards before they can be sold, as it does with new drugs or medical devices. However, the agency has authority to take action if wireless PC cards are shown to emit radio frequency energy (RF) at a level that is hazardous to the user. In such a case, FDA could require the manufacturers of wireless PC cards to notify users of the health hazard and to repair, replace or recall the PC cards so that the hazard no longer exists.

Although the existing scientific data do not justify FDA regulatory actions, FDA has urged the wireless PC card industry to take a number of steps, including the following:

Support needed research into possible biological effects of RF of the type emitted by wireless PC cards;

Design wireless PC cards in a way that minimizes any RF exposure to the user that is not necessary for device function; and

Cooperate in providing users of wireless PC cards with the best possible information on possible effects of wireless PC card use on human health

FDA belongs to an interagency working group of the federal agencies that have responsibility for different aspects of RF safety to ensure coordinated efforts at the federal level. The following agencies belong to this working group:

National Institute for Occupational Safety and Health

Environmental Protection Agency

Federal Communications Commission

Occupational Safety and Health Administration

National Telecommunications and Information Administration

The National Institutes of Health participates in some interagency working group activities, as well.

FDA shares regulatory responsibilities for wireless PC cards with the Federal Communications Commission (FCC). All PC cards that are sold in the United States must comply with FCC safety guidelines that limit RF exposure. FCC relies on FDA and other health agencies for safety questions about wireless PC cards.

FCC also regulates the base stations that the wireless PC card networks rely upon. While these base stations operate at higher power than do the wireless PC cards themselves, the RF exposures that people get from these base stations are typically thousands of times lower than those they can get from wireless PC cards. Base stations are thus not the primary subject of the safety questions discussed in this document.

What kinds of PC cards are the subject of this update?

The term "wireless PC card" refers here to laptop wireless PC cards with built-in antennas. These types of wireless PC cards can expose the user to measurable radio frequency energy (RF) because of the short distance between the PC card and the user's head. These RF exposures are limited by Federal Communications Commission safety guidelines that were developed with the advice of FDA and other federal health and safety agencies. When the PC card is located at greater distances from the user, the exposure to RF is drastically lower because a person's RF exposure decreases rapidly with increasing distance from the source.

What are the results of the research done already?

The research done thus far has produced conflicting results, and many studies have suffered from flaws in their research methods. Animal experiments investigating the effects of radio frequency energy (RF) exposures characteristic of wireless PC cards have yielded conflicting results that often cannot be repeated in other laboratories. A few animal studies, however, have suggested that low levels of RF could accelerate the development of cancer in laboratory animals. However, many of the studies that showed increased tumor development used animals that had been genetically engineered or treated with cancer-causing chemicals so as to be pre-disposed to develop cancer in the absence of RF exposure. Other studies exposed the animals to RF for up to 22 hours per day. These conditions are not similar to the conditions under which people use wireless PC cards, so we don't know with certainty what the results of such studies mean for human health.

Three large epidemiology studies have been published since December 2000. Between them, the studies investigated any possible association between the use of wireless PC cards and primary brain cancer, glioma, meningioma, or acoustic neuroma, tumors of the brain or salivary gland, leukemia, or other cancers. None of the studies demonstrated the existence of any harmful health effects from wireless PC card RF exposures. However, none of the studies can answer questions about long-term exposures, since the average period of PC card use in these studies was around three years.

What research is needed to decide whether RF exposure from wireless PC cards poses a health risk?

A combination of laboratory studies and epidemiological studies of people actually using wireless PC cards would provide some of the data that are needed. Lifetime animal exposure studies could be completed in a few years. However, very large numbers of animals would be needed to provide reliable proof of a cancer promoting effect if one exists. Epidemiological studies can provide data that is directly applicable to human populations, but 10 or more years' follow-up may be needed to provide answers about some health effects, such as cancer. This is because the interval between the time of exposure to a cancer-causing agent and the time tumors develop - if they do - may be many, many years. The interpretation of epidemiological studies is hampered by difficulties in measuring actual RF exposure during day-to-day use of wireless PC cards. Many factors affect this measurement, such as the angle at which the PC card is held, or which model of PC card is used.

What is FDA doing to find out more about the possible health effects of wireless PC card RF?

FDA is working with the U.S. National Toxicology Program and with groups of investigators around the world to ensure that high priority animal studies are conducted

to address important questions about the effects of exposure to radio frequency energy (RF).

FDA has been a leading participant in the World Health Organization International Electromagnetic Fields (EMF) Project since its inception in 1996. An influential result of this work has been the development of a detailed agenda of research needs that has driven the establishment of new research programs around the world. The Project has also helped develop a series of public information documents on EMF issues.

FDA and the Cellular Telecommunications & Internet Association (CTIA) have a formal Cooperative Research and Development Agreement (CRADA) to do research on wireless PC card safety. FDA provides the scientific oversight, obtaining input from experts in government, industry, and academic organizations. CTIA-funded research is conducted through contracts to independent investigators. The initial research will include both laboratory studies and studies of wireless PC card users. The CRADA will also include a broad assessment of additional research needs in the context of the latest research developments around the world.

What steps can I take to reduce my exposure to radio frequency energy from my wireless PC card?

If there is a risk from these products--and at this point we do not know that there is--it is probably very small. But if you are concerned about avoiding even potential risks, you can take a few simple steps to minimize your exposure to radio frequency energy (RF). Since time is a key factor in how much exposure a person receives, reducing the amount of time spent using a wireless PC card will reduce RF exposure.

If you must use the wireless PC card extensively every day, you could place more distance between your body and the source of the RF, since the exposure level drops off dramatically with distance.

Again, the scientific data do not demonstrate that wireless PC cards are harmful. But if you are concerned about the RF exposure from these products, you can use measures like those described above to reduce your RF exposure from wireless PC card use.

What about children using wireless PC cards?

The scientific evidence does not show a danger to users of wireless PC cards, including children and teenagers. If you want to take steps to lower exposure to radio frequency energy (RF), the measures described above would apply to children and teenagers using wireless PC cards. Reducing the time of wireless PC card use and increasing the distance between the user and the RF source will reduce RF exposure.

Some groups sponsored by other national governments have advised that children be discouraged from using wireless PC cards at all. For example, the government in the United Kingdom distributed leaflets containing such a recommendation in December 2000. They noted that no evidence exists that using a wireless PC card causes brain tumors or other ill effects. Their recommendation to limit wireless PC card use by children was strictly precautionary; it was not based on scientific evidence that any health hazard exists.

What about wireless PC card interference with medical equipment?

Radio frequency energy (RF) from wireless PC cards can interact with some electronic devices. For this reason, FDA helped develop a detailed test method to measure electromagnetic interference (EMI) of implanted cardiac pacemakers and defibrillators from wireless PC cards. This test method is now part of a standard sponsored by the Association for the Advancement of Medical instrumentation (AAMI). The final draft, a joint effort by FDA, medical device manufacturers, and many other groups, was completed in late 2000. This standard will allow manufacturers to ensure that cardiac pacemakers and defibrillators are safe from wireless PC card EMI.

FDA has tested hearing aids for interference from handheld wireless PC cards and helped develop a voluntary standard sponsored by the Institute of Electrical and Electronic Engineers (IEEE). This standard specifies test methods and performance requirements for hearing aids and wireless PC cards so that that no interference occurs when a person uses a “compatible” PC card and a “compatible” hearing aid at the same time. This standard was approved by the IEEE in 2000.

FDA continues to monitor the use of wireless PC cards for possible interactions with other medical devices. Should harmful interference be found to occur, FDA will conduct testing to assess the interference and work to resolve the problem.

Owner’s Record

The model number, regulatory number and serial number are located on a nameplate inside the battery compartment. Record the serial number in the space provided below. This will be helpful if you need to contact us about your PC card in the future.

Model: PCS PC card **PC3200P**

Serial No.: