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A PATH FOR HORIZING YOUR INNOVATIVE WORK

PLASMA SILICON ANTENNA

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Abstract: Growing need for speed of communication network along with data handling capacity are the major forces helping to explore new vistas of transmission and reception. With the wireless generations moving from 2G to 3G, 4G, 5G and so on, the real benefit of upgrading the Wi-Fi networks is to get them to run faster. Wi-Fi usually can manage 54 megabits of data per second. The fancied Wi-Fig (a graphical user interface for configuring wireless connection) would handle up to 7 gigabits per second. As more people worldwide demand access to the growing mobile Internet phenomenon, engineers are being pressured to develop a new antenna that can handle an increased user base while increasing data transmission speed. To accomplish this synthesis of growth and speed, the new antenna must to be capable of transmitting data at speeds exceeding limits of current metal antennas. The Plasma Silicon Antenna (PSiAN) can achieve this goal. It is to explain both the technical details of these revolutionary plasma silicon antennas, and how the modern technology would meet current societal needs. This seminar will provide a short introduction how metal antennas and today's mobile communications networks operate, and then show how PSiANs will work and improve the standards of the mobile communications network. Also, this paper will discuss the environmental sustainability of the technology and the economic advantages it could bring to the world.

Keywords: **RF:** Radio frequency, **AM:** Amplitude Modulation, **FM:** frequency Modulation, **UHF:** Ultra High frequency, **VHF:** Very High frequency, **PSiANs:** Plasma Silicon Antennas

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INTRODUCTION

The different states of matter generally found on earth are solid, liquid and gas. Sir William Crookes, an English physicist, identified a fourth state of matter, now called plasma, in 1879. Plasma is by far the most common form of matter. Plasma in the stars and in the tenuous space between them makes up over 99 per cent of the visible universe and perhaps most of what is not visible. Important to antenna technology, plasmas are conductive assemblies of charged and neutral particles and fields that exhibit collective effects. Plasmas carry electrical currents and generate magnetic fields. A plasma antenna is a type of antenna in which the metal-conducting elements of a conventional antenna are replaced by plasma. These are radio frequency antennas that employ plasma as the guiding medium for electromagnetic radiation. The plasma antennas are essentially a cluster of thousands of diodes on a silicon chip that produces a tiny cloud of electrons when charged. These tiny, dense clouds can reflect high-frequency waves like mirrors, focusing the beams by selectively activating particular diodes. The 'beam-forming' capability could allow ultra-fast transmission of high data loads like those needed to seamlessly stream a TV show to an untethered tablet-creating an attractive option for the next generation of supercharged wireless transmitters. Many types of plasma antennas can be constructed, including dipole, loop and reflector antennas. Plasma antennas are interpreted as various devices in which plasma with electric conductivity serves as an emitting element. In gas plasma antenna the concept is to use plasma discharge tubes as the antenna elements. When the tubes are energized, these turn into conductors, and can transmit and receive radio signals. When de-energized, these revert to non-conducting elements and do not reflect probing radio signals. The fact that the emitting element is formed over the interval needed for the emission of an electromagnetic pulse is an important advantage of plasma antennas.

LITERATURE REVIEW:

Physically, an antenna is an arrangement of one or more conductors, usually called elements. In transmission, an alternating current is created in the elements by applying a voltage at the antenna terminals, causing the elements to radiate an electromagnetic field. In reception, the inverse occurs. An electromagnetic field from another source induces an alternating current in the elements and a corresponding voltage at the antenna's terminals. Some receiving antennas (such as parabolic and horn types) incorporate shaped reflective surfaces to collect the radio waves striking them, and direct these waves onto the actual conductive elements. Some of the first rudimentary antennas were built in 1888 by Heinrich Hertz (1857-1894) in his pioneering experiments to prove the existence of electromagnetic waves predicted by the theory of James

Clerk Maxwell. Hertz placed the emitter dipole at the focal point of a parabolic reflector. The words antenna (plural: antennas) and aerial are used interchangeably, but usually a rigid metallic structure is termed an antenna and a wire format is called an aerial.

WIRELESS INDUSTRYS WORK:

Wireless communication technology is a rapidly growing industry, generating billions for companies that are major players in the market. AT&T, for example, had a $12 billion dollar profit in 2009, and while AT&T does more than just mobile communications, it is a huge contributing factor to the company's profit. Text messages alone generate about $812,000 a minute for the industry worldwide.

TODAY'S WIRELESS COMMUNICATION'S TECHNOLOGY:

At the present time, wireless technology is in its third generation. This third generation, or 3G, as it is often referred to, is more correctly identified as International Mobile Communications-2000 (IMT-2000). It is the latest mobile communications standard approved by the International Telecommunications Union, the United Nations agency concerned with information and communication technologies. Since 2000, mobile technology has evolved past the IMT-2000 standard, but not to the point where it should be considered a new, fourth generation, or 4G.

FUTURE SCOPE:

If we are not yet at the fourth generation, what will the fourth generation look like? How will we as a society get to that future goal?

To answer these questions, the ITU has published some goals that it believes a particular technology must attain for it to be a true fourth generation. The listed goals are most important to future users (as opposed to goals set for communications providers) are as follows: worldwide roaming capability; high quality mobile services; user-friendly applications, services and equipment; "user equipment suitable for worldwide use"; "capability of interworking with other radio access systems" (for example, a phone that can work using CDMA2000 and TD-SCMA); and the aforementioned data transfer goals. Attaining these goals will not just accomplish themselves; there must be technological innovations that make these future goals possible. Plasma Silicon Antennas have the potential to be such an innovation. They are geared more towards higher data transmission rates than antennas used now. To understand the difference between the present state of antenna technology and the possible PSiAN future of antennas, present-day antennas must be understood for a comparison between the two to be worthwhile. So before describing how PSiANs are manufactured and how they operate, we will profile metal antennas that are in common use today.

TECHNOLOGY USED:

Plasma Silicon Antennas are a next step in smart antenna development. PSiANs operate similarly to today's smart antennas in that they transmit waves directly towards the user, and not Omni-directionally. However, the basic operation of the plasma antenna is very different from traditional antennas. Where traditional antennas use strips of metal to send and receive signals, plasma silicon antennas use an electrically conducting silicon chip.

Plasma Silicon Antennas consist of a silicon wafer with tiny regions of silicon dioxide on its surface . When these areas are activated, they produce a cloud of electrons. This cloud of electrons is the plasma, and the plasma can be used to reflect or absorb radio waves (depending on if the desired function of the antenna is transmitting or receiving signals). The regions can be activated electronically in specific patterns, and each pattern reflects the waves in different directions. Because the direction of the radio wave transmission can be changed electronically (as opposed to a switch changing the beam's direction), the antenna is **electronically steerable**, which allows for greater antenna versatility.

CONCLUSION:

Plasma Silicon Antennas hold much promise in the field of mobile communications. They are electronically steerable and beam forming, two traits that allow for more precision and higher data transfer rates. They are made from silicon, a common element in the Earth's crust, as opposed to today's metal antennas that need less abundant elements such as copper and aluminum to be manufactured. Additionally, silicon can be produced without emission of fossil fuels, unlike aluminum. A PSiAN's denser beam means not only more data transmitted but also an increase in the supportable user base, meaning telecommunications companies can build fewer antennas and save money. The potential of Plasma Silicon Antennas is great, and their future use in mobile communications looks bright.

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