LOW PROFILE DISTRIBUTED ANTENNA

The performance of indoor wireless communication systems, such as a radio frequency identification (RFID) system or wireless local area networks (WLANs), depends on the signal strength available at the receiving antenna, or more specifically, the signal-to-noise ratio (SNR) that the systems can obtain at the receiving end. Most systems use a single base station antenna that broadcasts enough power to sufficiently cover a given area. However, the signal strength may have a very significant variation, which is determined by the distance from the base station antenna to the receiver, signal attenuation caused by intervening structures between the base station and the receiver and the multi-path caused by scattering from nearby structures. Hence, the coverage is always limited, and an improvement is implemented to use higher transmitting power and/or multiple base stations to provide proper coverage for larger areas. There is clearly a need to develop a system of improved wireless coverage without greatly increasing the level of complexity and cost for a wireless system.

THE TECHNOLOGY

The solution from researchers at The Ohio State University, led by Robert Burkholder and Walter D. Burnside, provides a low profile distributed antenna (LPDA) which comprises a first and second elongated continuous conductors being kept parallel to each other and forming a transmission line, a plurality of perturbations on the first elongated continuous conductor, wherein a substantial amount of radio frequency energy transmitted by the transmission line radiates from the plurality of perturbations, therefore, the transmission line serves as a low profile distributed antenna. The LPDA may be mounted along a wall, ceiling, or along shelves, and may have wide wireless applications.

The simplicity of this antenna system is that each radiator is fed in series; thus, one can have many radiators but only one feed point. In addition, the transmission line used to feed this structure is a very simple parallel-plate structure as opposed to more complex rectangular waveguides or coax cables. To illustrate this point, one can think of the parallel-plate structure as being made of a thin foam spacer that is used to separate two conductors, which can be conducting tape, conducting thin films, etc. Obviously, this type of parallel-plate structure is much simpler to build but it does not seem to be very precise or structurally sound. That is not the case in that the foam spacer can be manufactured today to very fine tolerances (a few thousands of an inch tolerance is achievable today in mass production). Also, this antenna can be encapsulated in a conduit that is used to precisely align the parallel-plate structure along its length and to protect it from a hostile outside environment. Since the conduit structure can be easily made using mass production techniques, this whole new antenna concept lends itself to precise, low cost, high volume antenna applications.

INVENTORS

Dr. Burkholder received his B.S., M.S., and Ph. D. degrees in Electrical Engineering from The Ohio State University, Columbus, in 1984, 1985, and 1989, respectively. From 1989 to the present, Dr. Burkholder has been with The Ohio State University Department of Electrical and Computer Engineering at the ElectroScience Laboratory where he is currently a Research Professor. His research specialty is in EM Math Modeling using high-frequency asymptotic techniques and their hybrid combination with numerical techniques to solving large-scale electromagnetic radiation and scattering problems. He is currently involved in the areas of item-level RFID, through-wall radar imaging, and the analysis of antennas mounted on ships and aircraft.

Dr. Walter D. Burnside received his M.S. degree in 1968 and the Ph.D. degree in 1972, all in Electrical Engineering, from The Ohio State University, Columbus. He joined the ElectroScience Laboratory in 1966 and served as its Director from 1994 to 2002. His main interests have been in the applications of wedge diffraction, the geometrical theory of diffraction, broad-band antennas, airborne antenna analysis, hybrid solutions, and various high-frequency scattering solutions.

CONTACTS

CDME

1314 Kinnear Road, Columbus OH, 43212
cdme.osu.edu

Eric Wagner, Collaboration Manager
wagner.293@osu.edu • 614-477-0303

Technology Commercialization Office

Christopher Wohlgamuth, Licensing Manager
wohlgamuth.5@osu.edu • 614-247-8331