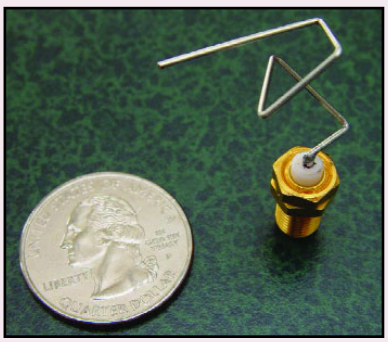
The magazine for manufacturers and integrators of antennas, components and infrastructure for the wireless communications industry

ANTENNA SYSTEMS & TECHNOLOGY

Computer-Evolved Antenna Built by JEM Engineering Becomes First in Space

JEM Engineering, a custom antenna design, manufacturing and testing services company, has co-engineered an artificially-evolved antenna with NASA, becoming the first of its type in space. The evolved antenna, mounted on three of NASA's Space Technology 5 (ST5) satellites, was launched into an Earth orbit on March 22, 2006.

The evolved antenna used on the ST5 satellites was designed at the NASA Ames Research Center located in Moffett Field, Calif. on a cluster of eighty PCs. With years of experience in this technology as well as one of the original pioneers of evolved antennas, JEM was a critical part of the Ames design team on this effort. The evolved antenna is lighter, costs less and performs better than conventionally designed antennas. Since the evolved antenna was designed using artificial evolution, independent of a human engineer, a computer created a set of random antenna designs, each with a genetic code dictating its shape. Antenna designs that performed well were "mated" to create new designs, and over many generations, the final design emerged.



In March, NASA launched the ST5 satellites to study both the Earth's magnetosphere as well as to demonstrate new technologies to be used in space. The evolved antenna was one of these new technologies, and each satellite carried one of the evolved antennas to communicate with NASA ground stations.

"As crazy and haphazard as these evolved antenna designs look, they have nearly always worked as predicted by simulation from the first time they're built and tested," said Derek Linden, PhD, chief scientist for JEM Engineering, and one of the inventors of this patented technology. "What's so great about the design process is that it requires much less human involvement to achieve great performance," said Linden.

"This is the first time a part of a spacecraft was designed using artificial means, and NASA is continuing to develop evolvable hardware for many applications including circuits, systems and antennas to increase performance and enhance survivability in harsh environments," said Jason Lohn, PhD, a NASA Ames associate who was the lead researcher for the NASA Ames design team.

"The evolved antennas have better design properties than the original antennas specified for the ST5 mission," said Victor Sank, PhD, ST5 communications lead. "Had we been aware of the evolved antenna concept, we would have specified evolved antennas for all six ST5 satellite antennas instead of the current complement of one evolved antenna and one quadrafilar helix on each spacecraft."

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