



## **High Temperature Superconductors**

This report provides an overview of the efforts within the U.S. to commercialize high temperature superconductor-based receiver front end subsystems for commercial land-based wireless communications applications- The information presented here represents the combined, interpreted opinions of a broad based sample of superconductivity technologists, wireless service providers, wireless experts, and other individuals involved in the superconductor industry.

Researchers have been developing High Temperature Superconductor (HTS) materials, devices, and systems for a broad range of applications. The higher operating temperatures of HTS made the materials easier to work with, as well as promising greater technological and economic potential. Liquid nitrogen, which costs less than beer, is cheaper and safer to use than liquid helium. Although this cryogen (a substance for super-cooling) is routinely used in the laboratory, most commercial electronic HTS systems, such as those built for commercial wireless communications, incorporate cryocoolers (super-cold refrigerators) which cool the superconductive device directly. In addition, manufacturers can more readily control the operating temperature of their systems with cryocoolers, to optimize performance.

### ***Superconductor Applications***

- Transportation
- Medicine
- High-Energy Colliders
- Generators
- Fault current limiters
- Transmission & Distribution Cables
- Transformers
- Tapes
- Energy Storage
- Microchips
- Military
- Emerging Technology

### ***Market Summary***

According to various estimates, the worldwide market for superconductor products is projected to grow to near \$90 billion by the year 2010, and \$200 billion by 2020. However, at 3M, market research points to a potential market in the United States, Japan, and Europe for superconductor products and services reaching \$122 billion by the year 2020 – still quite a large target market. This is, of course, contingent upon a linear growth rate. Should new superconductors with higher transition temperatures be discovered, growth and development in this new field could explode almost overnight.



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