

## ***Third-generation Cellular: Technical and Economic Challenges***

### **Abstract**

This paper examines the third-generation cellular standards (there are five!) and provides a status report on each.

Almost all “3G” networks will be built over the existing networks of cellular incumbents. We therefore examine the technical ramifications of the new technologies’ characteristics – data rate, modulation schemes, link budgets, frequency bands – on 3G’s range, building penetration and capacity, compared to the underlying 2G networks. We find that in some cases substantial numbers of new base stations will be required to fulfill the potential of the new technology. This in turn has an impact on the cost of providing the service.

Adding to the technology-driven economic burden of the new services is the fact that, in many cases, the incumbents have spent vast amounts of money acquiring (through auctions) new spectrum on which to offer the service. These amounts dwarf not only the annual revenues of even the largest cellular companies, but also the Gross Domestic Product of many developed nations! We will discuss this “tax in advance of profits” and its likely impact on the industry.