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3G/4G Technology: Does the Standard Really Matter?

Gary Breed
Editorial Director



Behind all the marketing and advertising of “mobile broadband” lie several different transmission technologies, including LTE, EDGE, W-CDMA, TD-SCDMA, HSDPA, WiMAX, some variations on these basic schemes, plus new systems still in development. Each method has its supporters, and each has performance differences compared to the others. The question that often comes up is, “Which one is best?”

My first guess at an answer is, “None of them.”

First, they all deliver much higher data speeds than the technologies they replace. Next, there are enough differences among them that any serious observer would see that each has its strengths and weaknesses. Some provide higher data rates; some offer a more straightforward evolution from systems already in operation.

My next guess at an answer is, “All of them.” Of course, proponents of each technology can point to certain specs and claim that theirs is the best. (And boy, do they make those claims loudly!) That’s not really my concern—what I mean by “all of them” is that demand for higher speed mobile data services is growing, and wireless system operators need to keep working to get the technology deployed, regardless of which standard they have chosen for implementation.

There is some concern that having different systems available is a problem, but here in the U.S., where the distribution of handsets is mainly done by the operators and their agents, compatibility is a minor issue. Other parts of the world have uniform standards for their original voice-based systems, but even some of these countries/regions are allowing service providers to use different technologies for broadband communications. Even when a single standard is mandated, the chosen standards are different from one wireless market to another.

Fortunately, the issue of multiple standards (plus variants) is also being addressed by the handset and mobile appliance makers—with software-adaptable radio and baseband technologies that allow one handset, PDA or other device to handle multiple standards. These flexible devices may even allow updates and reconfiguration of networks in the future, making the choice of transmission technology almost irrelevant. Weaknesses can be addressed by changing the modulation or data format “on the fly” without the user even knowing about it. Such a universal

phone would also reduce the number of different models, saving costs and lowering prices.

The Broadband Market

Sometimes I wonder how much real demand there is for broadband services, and how much of the “demand” is really a push from the system operators and mobile device makers—the wireless version of super-sizing that fast-food meal.

I’ve decided that the present status is definitely a push from the providers. Sure, there is significant demand for high speed Internet with the convenience of cell phone style portability, but that demand is probably not sufficient to pay back the cost of initial deployment of such a major system upgrade. Thus, it is a business necessity to develop a consumer market in addition to a serious user market.

Wireless operators are working hard to recruit casual users who are willing to pay for broadband access that is primarily used for personal entertainment.

There is no doubt that the future will unfold with a vast array of services that take advantage of high speed wireless communications. And there is also no doubt that present standards used to start down that path will regularly be replaced with improved technologies.

Notes on Other Topics

Last issue’s “Design Notes” column on writing styles and proper presentation of numbers and units generated plenty of comments. We received nearly as much feedback as the “Why 50 Ohms?” topic of a couple years ago! With so much feedback, plus additional informa-

tion we have found, we decided to follow up on this topic in this month’s Design Notes column.

The economic downturn seems to have created extra time for engineers to do some writing. Over the past few months, we have seen an increase in article proposals, particularly those with significant depth and substance. In this issue, Dr. Grebennikov’s article on linearization and the review of 3G nonlinearity specs by engineers at Broadcom are good examples.

You can look forward to reading future articles on locating antennas within enclosures, receiver architecture planning, low voltage power amplifiers, software-defined radio, and an interesting examination of the combined analytical/intuitive process that engineers use to find new design solutions.