# Wireless Modules:
## Big Benefits in Little Packages

*by David McCartney, Wavecom, Inc.*

We think, we talk and we use wireless communication devices today — but just wait. The airwaves of the future will be carrying everything from mundane personal voice calls to empty soft drink vending machines calling the local distributor for a refill. As we make the migration to this new wireless world, designers and developers of these new devices and applications will be looking for one simple thing — a Plug-N-Play wireless solution. This new one-stop wireless approach, which offers the designer and developer an end-to-end integrated wireless solution they can count on, has the distinct advantage of reducing an OEM's time to market. In addition, by utilizing a pure wireless environment, more resources can be focused on developing new and relevant wireless applications from personal communication devices and mobile computing to telematics and machine-to-machine or telemetry. Plug-N-Play solutions also break down the market barriers surrounding the wireless industry.

This article will look at the many needs wireless modules fulfill in today's wireless marketplace and how developers can benefit the most from their use.

### Radio 101

Deploying wireless connectivity sounds simple, but for those not experienced in the "black art" of radio communication, simple things become almost impossible feats to accomplish. Several factors make wireless communication unique. First, every wireless device, be it a cell phone of a WLAN or some other device, must push signals across the airwaves at precisely the right power level and in the exact transmission format. They must be tuned to receive powerful incoming signals from one or more channels. Antennas catch irregular analog signals traveling through space on "carrier" frequencies; incoming radio signals must then be converted to an intermediate frequency (IF) through combination with another radio wave produced inside the receiver. Then, the carrier wave gets subtracted to put the signal into baseband — that is, a power level and speed that ordinary digital processors can handle. While the signal is in baseband, it is translated into a stream of binary ones and zeroes, which are in turn decoded, decrypted and formatted into voice or data.

Next comes the rise in computing complexity, which is exacerbated by the push to send signals much faster. The growth of wireless services (3G, IEEE 802.11, Bluetooth and others) will use more spectrum and more instantaneous bandwidth than ever before to provide data rates up to 2 million bits per second (required by streaming video and multimedia applications). All these demands mean wireless communication requires more expertise in design and integration — thus the need for a Plug-N-Play solution, which incorporates all of the above technology into one compact device.

### Benefits to Designers/Implementers

Given the complexity of today's ultra-competitive marketplace, one problem facing many wireless designers/implementers is how to address the different market segments with limited design resources. The problem is compounded by the relatively long gestation period required



for product development. In fact, it can be argued that today's development times are longer than our product life cycles, a true challenge and problem for a wireless implementer that makes Plug-N-Play a viable solution.

There is a growing need for manufacturers to enhance their competitive position by producing products that incorporate wireless features. Some of these features can be provided through incremental changes to existing designs, while others require whole new RF designs. Developing new RF designs from scratch is costly and time consuming, and it is only likely to be successful if carried out by an experienced RF design team. Faced with a global shortage of RF engineers, wireless implementers are now looking to reduce their risk by looking to outsourcing, joint ventures, acquisitions or a Plug-N-Play option.



### Integration Issues/Challenges

By incorporating one of these options, manufacturers can greatly reduce or eliminate many of the key challenges wireless designers and implementers face in bringing a new device through development and into the marketplace. Depending on the level of expertise and services offered by these outside companies, manufacturers can greatly benefit from:

- Design guidelines and integration recommendations,
- Schematic reviews, full printed circuit board or partial radio interface,
- Mechanical recommendation for audio and radio quality,

- Integration prototyping support, direct and/or with CM PCB design (Handsets, Automotive, etc.),
- Peripherals selection and recommendation (e.g. battery, speakers),
- Debugging, testing and fixes of printed circuit board integration bugs,
- Custom AT Commands,
- Full MMI Development, and
- Open MMI Customization.

### Certification Requirements/Support

In addition to spending resources on the research and development process, manufacturers must also navigate the time-consuming certification process for new wireless devices with the FCC, carriers and governing associations (see below). Companies, such as Wavecom, who provide an end-to-end wireless solution manage the entire approval process and provide other areas of support.

### The Future

As manufacturers focus on target markets, they will again look towards the mass-market solutions of the old AMPS days. To accomplish this mass appeal, wireless implementers/manufacturers will have to incorporate wireless solutions that address at least two air interfaces: GSM or CDMA. One exciting solution that is still a few years away is the move toward software-defined handsets capable of operating over any frequency and air interface. Software phones are radios in which a large portion of the functionality is implemented through a programmable signal-processing device. The concept of a software radio has been around for years, primarily in military applications. Rather than connecting pieces of hardware, manufacturers will be able to build multi-mode/multi-frequency handsets using software to meet users' application requirements. But to meet today's challenges, companies like Wavecom, must offer form factor interchangeability between CDMA and GSM solutions in the modules they produce. This interchangeability will give manufacturers the flexibility to cost effectively reach global markets with a single product that can easily be converted to operate on either standard.

With so many different wireless technologies and so many different ways to meet customer expectations, the prospects developed today have an ever-shortening life cycle. But the future will offer tremendous rewards for companies able to rise to the challenge.

*David McCartney is Vice President, Marketing and Business Development for Wavecom, Inc.*

**Write in 5316** or **www.ecnmag.com/info**