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Featuring:
Derek Kerton
Principal Analyst - The Kerton Group

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Reality Check: Overcoming the challenges of delivering high-speed wireless data services

October 13 2009 - 6:00 am ET | Rob Rovetta, VP of Products, Quantance Inc. | [RCR Wireless News](#)

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Rob Rovetta, VP of Products, Quantance Inc.

Photo credit: Quantance

***Editor's Note:** Welcome to our weekly Reality Check column. We've gathered a group of visionaries and veterans in the mobile industry to give their insights into the marketplace.*

High-speed wireless data applications are exploding in popularity. The Wireless Federation noted in late 2008 that "mobile network operators in developed regions should prepare for a tenfold increase in wireless network traffic by 2015, as data traffic rapidly overtakes voice."

With demand for high-speed data increasing, wireless carriers have a great opportunity to grow their revenue and differentiate offerings. To accommodate demand, carriers are enhancing their underlying network technology to handle more data at faster speeds. In recent years, the high speed packet access (HSPA) standard has been introduced as the first step toward higher performance in WCDMA networks.

But with the accelerating growth of data services, networks must deliver capacity and speed beyond what initial HSPA standard can provide. To address these immediate needs without significant infrastructure changes, many wireless carriers are upgrading their networks to evolved HSPA (HSPA+), which currently increases data capacity and doubles uplink speeds compared to HSPA standard.

HSPA+ reaches its limits

HSPA+ enhancements are designed to improve data speed and capacity by using higher order modulation (HOM) to pack more data into the same radio bandwidth used by HSPA. HSPA+ signals are four times more complex than today's HSPA signal and require more signal power to maintain performance. However, even today's HSPA mobile devices are often unable to produce maximum power signals consistently or reliably.

As a result, HSPA performance suffers. And for HSPA+, which requires even more power, the chances of achieving its full promise can be severely limited even under normal conditions. Without enough signal power, either data transmission must be slowed or data coverage significantly reduced, eliminating some or much of

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the benefit of the HSPA+ enhancements.

This has the impact of literally shrinking effective coverage of a cell site or severely reducing data speed across large parts of the cell. Each day bloggers vent their frustration with 3G data performance, which shows how the average user is negatively impacted by HSPA-enabled data cards and smart phones. Given HSPA+'s basic need for more power, it's easy to conclude that we will see an even bigger impact on users of HSPA+-enabled devices, which are coming later this year.

Getting the most out of HSPA+

Clearly, if the industry is going to deliver the full potential of HSPA+, something must be done to compensate for this signal power problem. Wireless carriers could add more cell towers to provide better coverage. But this would limit improvement only to small geographic areas and is generally unrealistic given the cost of comprehensive network overhauls and political barriers to locating new towers. A more effective alternative with more immediate and widespread impact entails increasing the signal power being transmitted from existing cell towers and mobile devices.

Increasing power is reasonably straightforward at the cell towers, but a bigger challenge for the mobile devices. Mobile device transmission circuits use power amplifiers (PAs) that either cannot produce the maximum signal strength needed or struggle to produce it while overheating, distorting the signal or using battery power unacceptably fast.

For data transmissions, the HSPA+ signals have high peak to average ratios (PAR) that cause large swings in voltage levels at the PA and distort much more easily as they are amplified by the PA, particularly at high PA output power. Unfortunately, to maintain signal quality and appropriately manage the high PAR signals, the PA must actually *reduce* its maximum transmit power levels.

Ironically, in a case where more power is needed, the mobile device actually produces less power, barely meeting the minimum called for in the 3GPP standard. On average for devices meeting the minimum performance, HSPA uplink power from some common data cards reaches only about 20dBm output levels, which is 4.0 dB below the baseline 3GPP specification and the HSPA+ maximum output power is expected to be even less.

Putting power in the users' hands

An ideal way to attack these power challenges at the source could be making the radiofrequency (RF) front end of mobile devices operate more efficiently and with greater linearity, enabling mobile transmit power that is near the desired 3GPP baseline and well above the minimum. This would eliminate the PA's inability to efficiently amplify high PAR HSPA+ signals at maximum and midrange output powers.

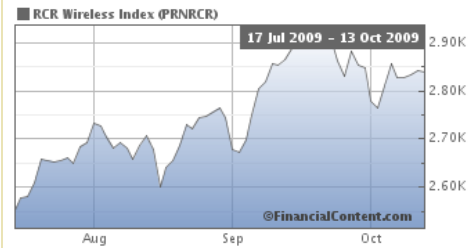
By incorporating this solution into the mobile device, the problems

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associated with limited PA output power could be eliminated, enabling a device to regain most of the power the PA cannot otherwise produce for high PAR signals and regaining coverage and data speed benefits otherwise lost. This technological advancement also would eliminate the need for forklift upgrades to the networks while delivering performance that end users expect.

The exploding demand for wireless data is driving the deployment of HSPA+ to provide faster, higher capacity data services. However, with that comes the need for more uplink signal power from the mobile device that cannot be easily met by today's PA technology. By addressing the fundamental problem of PA efficiency in the mobile device, wireless carriers could take full advantage of network enhancements using HSPA+ and end users could receive the level of service and performance for wireless data that they expect.

Rob Rovetta is VP of Products for Quantance Inc. Rovetta has over 25 years of experience in wireless communications, GPS and digital processing systems in both business and engineering roles. Prior to Quantance, he was senior director of Product Management at Qualcomm's chip division responsible for defining strategic opportunities, marketing, licensing and launching assisted-GPS (AGPS) and Qualcomm's gpsOne technology in location-based services worldwide. Rob came to Qualcomm from SnapTrack, Inc., the start-up that pioneered AGPS, where he was responsible for licensing AGPS silicon and software to chip manufacturers and handset OEMs. Prior to SnapTrack, Rob held leadership positions for Magellan Corporation and Trimble Navigation, where he led business development and product management for GPS-enabled enterprise and consumer products. Before the GPS and communication industries, Rob worked for ROLM Corporation, where he had product management, program management, and system engineering responsibilities for digital processing systems. Rob started his career as a member of the development engineering staff at ESL/TRW, where he designed and produced VHF, UHF and microwave antenna systems for strategic and tactical reconnaissance. Rob earned a B.S. degree in Electrical Engineering from the University of California at Davis.

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