What Smartphones Need Now

News reports indicate that the iPhone 4S has stimulated users to increase mobile data usage by 1.6 times over that of the older iPhone 3G. This increase is probably a result of the inclusion of voice-initiated commands and cloud-based data search and storage on the device.

This increased usage may not be surprising when smartphone use for social networking and streaming movies is at an all-time high, and demand for broadband data shows no sign of slowing down. Consumer demand for Apple and Android devices and applications is causing smartphone users in densely populated areas like New York and San Francisco to experience slowdowns with their 3G devices.

One potential answer is 4G LTE, which promises speeds 10 times greater than existing 3G networks. However, as user expectations of 4G LTE smartphones rise due to the abundance of applications available from the Apple AppStore and Android Market, the design and functionality of these new media access devices must also continue to improve.

4G LTE is in its infancy compared to the number of customers who have yet to convert from existing 3G systems. As people flock to 4G networks in search of faster speeds and lower latency, the quality of the devices will dictate customer satisfaction and the future success of device equipment manufacturers.

To provide a compelling user experience, 4G smartphones and tablets must incorporate ever more powerful microprocessors and large, higher resolution displays to enable real-time processing of streaming HD video content. At the same time, these components must lightly sip power from the batteries that feed them. If the trend toward cloud-based applications, which synchronize traffic to and from the smartphone and remote servers in nearly constant fashion, is to continue, the myriad of radios that connect these LTE smartphones to the mobile network must advance both in the integration of operating frequency bands and in transmit and receive efficiency.

4G LTE relies on a radio protocol called multiple-in/multiple-out (MIMO) to increase

the data rate of transmission and reception over that of earlier wireless systems like 3G. This approach uses multiple antennas to simultaneously transmit two or more independent streams of data to these antennas so they can then be combined in the radio modem to increase throughput. If these and other antennas, which are all built into the smartphone, aren't well designed or if the user inconveniently covers them up with her hand (remember Apple's Antennagate last summer?) then MIMO throughput easily can be impaired.

Device designers are turning to tunable antenna modules to mitigate these wireless connectivity challenges. These tunable structures function as multiple individual antennas and can be controlled in their frequency of operation for optimal performance based on feedback provided by the microprocessor and sensors in the smartphone.

To emulate the success of the first iPhone, smartphone designers have tried to differentiate their devices by making them smaller or thinner or from exotic materials. Increasingly a large display and narrow bezel seem to be the dominant design characteristics. The physical features that really matter in 4G smartphones are a quality display large enough to watch a video, and an overall size that is thick enough for a comfortable grip yet fits comfortably in a pocket.

Whether you are a fan of Android or Apple, and assuming availability of compelling applications, it's crucial for 4G smartphones to have a clean and simple design and a great display. Perhaps the most critical LTE smartphone attribute is consistent connectivity and delivery of promised 4G speeds. That suggests smartphone makers already have gotten most of the equation right.

4G LTE smartphone makers should now focus on making sure the radios and antennas are as good as the display and the apps. With that "in hand," LTE smartphones literally will begin to deliver on the potential for lightning fast speed, even for wireless subscribers in New York and San Francisco.

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