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Leverage Technology Advances To Support 3G Wireless Applications

Much has been written lately about the expansion of 3G networks in Asia, Europe, and the Americas. Asia, for example, has been zealous in its adoption of next-generation wireless services. In Europe and the Americas, though, the deployment of 3G networks hasn't been as swift. Ongoing

flattening or even declining capital expenditure spending has slowed network deployment and will prevent the implementation of 3G services until a predictable quality of service can be guaranteed.

One of the most significant challenges service providers face is consumer demand for 3G wireless networks that match the performance, quality, and cost of wired networks, where bandwidth is virtually unlimited and cost is continuously decreasing.

PUSHING THE LIMITS • The industry has come a long way since early GSM networks supported 12-kbit/s data rates. HSDPA networks promise 5 to 15 Mbits/s. Additionally, Super 3G and WiMAX are expected to reach upwards of 100 Mbits/s. Yet the Shannon limit, first published in 1948 by Claude Shannon, places constraints on capacity in a wireless Gaussian Noise limited channel.

Initial WiMAX deployments will operate using larger channel bandwidths at the expense of in-building signal penetration. As the frequency used is increased, buildings become much more reflective, requiring a direct line of sight to the antenna. To increase the number of bits/second/Hz, the signal power must be increased, or the interference must be decreased.

Other issues need to be considered, such as distance to the user and channel delay. But the bottom line is that there is a tremendous need for better coding, higher efficiency and linearity, improved processing speeds, and multiple antenna arrangements such as multiple-input, multiple-output (MIMO).

Operators also are experiencing a decline in the average revenue per user (ARPU), driven by the rising costs of network deployment and pressure from consumers to offer enhanced services without increasing the price of service contracts.

Demand for versatile yet cost-effective 3G infrastructure solutions is on the rise in Europe and the Americas. Still, network operators realize that wholesale replacement of equipment with each new technology doesn't make business sense, as deployed hardware needs to be upgradeable and standards-based.

The industry hasn't quite reached the plug-and-play stage. But recent initiatives such as OBSAI (Open Basestation Architecture Initiative) and CPRI (Common Public Radio Interface) have made significant progress toward the vision of modular,

scalable, and upgradeable equipment.

For example, when the processing end of the basestation is centrally located, the RF transmitter and receiver can be located on top of a building and distributed over fiber and coaxial cable for maximum coverage or deployed at street level for maximum effectiveness. This gives network operators two or more options to meet various coverage and capacity requirements.

MORE SOLUTIONS • To further reduce expenditures and fast-track the delivery of the next-generation wireless services consumers demand today, service providers can select infrastructure solutions that support the remote adjustment of individual parameters such as antenna tilt, azimuth, and link power to reduce dropped or blocked calls and maximize data throughput.

Remote adjustment reduces on-site servicing. It also helps service providers track variations in user patterns and remotely adjust capacity requirements when periodic increases in network traffic occur.

The lesson to be learned? Network operators mustn't lose hope. They are closer than they think to achieving the goal of delivering cost-effective next-generation wireless services. ☐

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