THE WEEKLY NEWSPAPER FOR THE WIRELESS COMMUNICATIONS INDUSTRY

RCR

crain

MAY 15, 2000 • VOL. 19 • NO. 20

WWW.RCRNEWS.COM

broadband • cellular • data • internet • paging • pcs • satellite • smr

Advances in network design aid rapid buildout

BY ELIZABETH V. MOONEY

NEW YORK—In a perfect world, top executives would not implement a new promotion plan until they received assurances from the engineering department that the system could handle increased use.

Instead, demands for quick fixes after the fact are typical in an environment where increasing numbers of people are using more wireless phones in growing numbers of places, said Dominic Villecco, president of V-COMM L.L.C., a Cranbury, N.J., engineering firm. Villecco was vice president of engineering and operations for Comcast Cellular Corp. for many years.

There is no single solution. Tradeoffs are necessary. Long-term and short-term goals need to be assessed. The natural laws that govern the limits of radio-frequency communications cannot be changed. Furthermore, when zoning laws combine with human nature, the result is that a typical approval process for new cell sites takes an average of nine months to a year.

For network operators, one of the most promising pending developments is Internet Protocol, which will be huge when it hits the mainstream.

"The reason to do IP is that, today, you need direct and fixed connections to tandem (switches),


Villecco

and the network is preprogrammed as to how (transmissions) get to them. IP allows carriers to offer multiple services over multiple pipes," Villecco said.

As in e-mail, a string of numbers separated by periods will become the surrogate and repository for all user-related address and identification information. This will eliminate translation steps switches now must take.

"All vendors are working to move to IP-based switches, which look more and more like routers. As traditional switches and routers converge, the router recognizes and converts analog voice into packets and routes them through an Internet-like network," Villecco said.

"It's higher-tech because the software is more complex, but you need fewer frames, the physical boxes (inside each switching office), to handle equal functionality."

Even without IP, switches are capable of handling increasing numbers of calls while occupying less and less space. "Ultimately, though, switches will also have to be configured to handle a smaller geographical area," he said.

"At some point, the switching office will get too big and cumbersome and backhaul will become too complicated and expensive, especially if subscriber numbers reach the projections," Villecco predicted.

Advances in switching technology also are reducing the amount of application-specific hardware while enabling it to handle more and different kinds of tasks. At the same time, the software, which controls switch actions, is growing in intelligence and as a proportion of the total switching mechanism.

RF technicians and engineers have reaped a big benefit from these advances. Gone are the days of peering over paper diagrams while trying figure to out where the wires depicted are located.

"It's gotten to the point where the technician inputs software on a screen instead of trying to match some kind of blueprint to the wires in the (switching) office," Villecco said.

Radios have followed a similar evolutionary path. They used to be big copper cans comprised of tubes, each tuned to a different frequency.

"Each time you made a change to a cell site, you'd have to send a technician there to manually retune it, then throughout the network like a phone man with a list, tuning each channel. To expand the network, [a carrier] would have to expand its work force proportionately," he said.

"Because of the [research and development] money invested, the biggest issue for smart antennas is cost. You might spend $50,000, $60,000, $70,000 on a smart antenna, whereas conventional antennas cost $5,000 to $6,000."

"With the new, software-defined radio, everything is pre-tuned and you can download the configuration on the fly from a centralized location."

Combining schemes, "the plumbing that allows more than one radio to talk to one antenna," also have improved.

"An old style combiner had 15 pieces to handle a 300 MHz to 3 GHz frequency range. Now it has two or three pieces handling the same frequency range," Villecco said.

Repeaters, bi-directional signal amplifiers, are becoming "smaller, cheaper and available from more manufacturers, and they work in more frequencies and with more technologies than before," he said.

By design, repeaters are most helpful for obtaining in-building coverage because they extend the signals. However, they cannot expand call handling capacity.

"Typically, the limiting factor on a radio network is interference. Often carriers put in devices like smart antennas to manage interference because they're at capacity," Villecco said.

"Because of the [research and development] money invested, the biggest issue for smart antennas is cost. You might spend $50,000, $60,000, $70,000 on a smart antenna, whereas conventional antennas cost $5,000 to $6,000," he said.

In a congested area, if a smart antenna can substitute for an additional new cell site, which costs about $250,000, it is a worthwhile investment. That certainly is a better option than telling staff to reduce wireless sales. However, since customers are using their wireless phones in more and more locations, new cell sites likely will be necessary to handle this new kind of demand, he said.