

# Repeaters Can Solve Wireless System Growth Problems

By David McKay  
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Many wireless system engineers are still unaware of the capability of repeaters for the extension of wireless communications networks. Traditionally, repeaters have simply been “bi-directional RF amplifiers” used to extend the reach of rural base stations, or to allow in-town base stations to cover areas shadowed by hills, valleys or buildings.

Here at CI Wireless, we have added two major new dimensions to repeater operation — fiber optic interconnection using our EkoCel™ repeaters, and adaptive interference cancellation (AIC) in our recently-released Eko-BTS™ products.

The low loss characteristics of fiber allow a carrier to centralize base station radios and distribute radio signals to desired coverage areas where the size or cost of deploying additional base stations is not feasible. These repeaters are designed to enhance coverage and capacity in airports, malls, office campuses, industrial facilities, dense metropolitan areas, tunnels and highways. The system performance is compatible with CDMA, TDMA/IS-136 and PCS1900/GSM, and is forward-compatible with 3G/cdmaOne and W-CDMA. The fiber link not only carries radio traffic but also includes alarm and control signals for the base station and system diagnostics that can be accessed anywhere in the system.

Clearly, a repeater is no longer just antennas, amplifiers and connecting cables. The technology between the base station communication end of the system and the remote transmitters/receivers has evolved to a new, more capable level. Nowhere is this more evident than in our new Eko-BTS products using AIC technology. CI Wireless' implementation of DSP-based technology in the interconnecting link has been accomplished with the lowest possible time delay in the signal path, with the added ability to select only the desired base station transmission for rebroadcast. With these advantages, our repeaters can have higher power, since AIC achieves much greater

input/output isolation by cancelling out the repeaters' own transmissions. Self-interference, which formerly limited the power and range of a repeater, is reduced by 30 dB or more.

It is also important to note that AIC technology has been implemented with full compatibility with the major wireless protocols. The Eko-BTS repeaters can be used with AMPS, CDMA, TDMA, GSM and IDEN. CI Wireless is dedicated to offering the most advanced wireless distribution products available. The system can be selective down to the PN code for CDMA transmissions, or channelized to minimize the problem of time delay in TDMA systems.



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### The business value of repeaters

Repeaters are far more economical than a new base station when coverage must be extended beyond the range of existing base stations. With a growing user base, wireless communications providers want service extensions that increase coverage, not just distance. Coverage expansion can be inside buildings where the structure shields signals from the nearest base stations or reduces them to unreliable levels. It may also be underground, in congested areas or anywhere where better signals are required.

Repeaters also improve system capacity. This is not obvious, since no more base stations are added to the system! Repeaters allow each base station to operate closer to its capacity by filling “blind spots” in its coverage. More locations are served by the same number of base stations by eliminating unusable capacity.

To conclude, CI Wireless is totally focused on the distribution of RF signals, with products for cellular and PCS, SMR/ESMR, paging, LMDS, MMDS and conventional two-way radio. Our prod-

ucts are the tools our customers need to get the coverage they want. This is our expertise and that's what we will continue to do for the wireless industry. ■