



## Residential Wireless Coverage

### CASE STUDY

#### THE SITUATION

Unacceptable network quality is one of the main reasons for mobile subscriber churn. With industry churn rates as high as 25 percent annually, a service provider's entire customer base could be lost in a matter of a few years. A majority of these users will cite dropped and failed calls as the primary reasons for the switch.

The cost of acquiring new subscribers to replace the existing customer base can be enormous with Subscriber Acquisition Costs (SAC) at approximately \$350-\$400 per subscriber. Improvements in quality of service can directly impact a carrier's profitability through the cost savings associated with increased subscriber retention and the additional revenue gained from increased billable minutes of use resulting from improved signal quality. This improvement in signal quality will come from a combination of better noise figures and lower interference levels.

#### THE PROBLEM

One of the nation's largest wireless carriers wanted to improve dropped call (DC) and failed call attempt (FCA) rates for part of its network in the southeastern United States. The region, comprising approximately 53 square miles in a densely populated residential area, included 11 CDMA Base Transceiver Station (BTS) sites.

The wireless carrier had two options: Build additional expensive BTS sites, or enhance the existing sites to improve signal strength and reduce interference for a fraction of the cost.



## THE ADC SOLUTION

The wireless carrier turned to its longtime business partner, ADC, for help. Network technicians analyzed a cluster of 11 BTS sites for a two-week period. Each BTS site included a three-sector, diversity tower with the average height of each tower at 180 feet. Dropped Call (DC) and Failed Call Attempt (FCA) data was gathered on each sector of each tower.

DC and FCA rates were unacceptable for many of the BTS sites within the cluster. In fact, field tests revealed that more than five percent of all mobile calls in the region experienced service failure—with some areas reporting service loss as high as 10 percent. Insufficient uplink sensitivity at the base station was deemed to be responsible for the reduced signal strength throughout the coverage areas. There did not appear to be significant interference issues at most of the BTSs.

Since CDMA can be both uplink and downlink limited and ADC has shown that the use of a tower mounted amplifier can improve both the capacity and the coverage of each BTS\*, technicians installed ClearGain® Tower-Mounted Amplifiers (TMAs) as close as possible to each receive antenna on the towers. The ClearGain TMAs reduced the composite Noise Figure, which increased the uplink signal sensitivity of each BTS site. This, in turn, resulted in:

1. An increase in the allowable path loss (and therefore coverage area), or
2. An increase in capacity for a fixed coverage area, or
3. A reduction in mobile transmit power for a given coverage/capacity combination, which resulted in longer mobile phone battery life.

## BENEFITS REALIZED BY CUSTOMER

Technicians tabulated DCs and FCAs for two weeks after the TMAs were installed. Representatives from the wireless carrier were ecstatic with the results—as were their customers.

The ClearGain TMAs were estimated to expand service coverage area by up to 40 percent. Signals were able to reach users on the outermost areas of the region, even during periods of intense demand, e.g., weekday rush hour. As a result, the number of DCs decreased by approximately 21 percent after the ClearGain installation. The number of FCAs also decreased by approximately 21 percent.

Mobile phone users in the region can now place more calls, make longer calls and successfully complete more calls in an expanded geographic area. As a result, the wireless carrier has minimized customer churn and maximized revenue opportunities.

\*Reference ADC white paper "CDMA Coverage and Capacity" by Dr. Phil Wala, 17 October, 2006.



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