Product Insight

Adjustable Electrical Downtilt or Intelligent Site Placement for Small Cell Deployments?

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The goal of adding small cells to an existing cellular network is to increase network capacity while reducing the traffic on existing macro cell sites. Therefore, Kathrein has focused on expanding the flexibility for intelligent site placement of small cell antennas for optimal network results. The key to adding small cells in a network is to insert them without interfering with overlaying antennas. While adjustable electrical downtilt (AEDT) can be used to reduce interference between small cells, a better method for overall system performance is to locate antennas using surrounding features (usually buildings) to block the signals from other nearby small cells (or point the main beam in a direction that minimizes the interference).

A downtown city area is shown in Figures 1 and 2 with two methods of providing small cell coverage with four antennas. Figure 1 has the antennas placed so that AEDT is needed to reduce interference where the antennas face each other. This requires the small cells to be placed closer together, with more "smaller" cells. Figure 2, on the other hand, shows the small cell sites positioned so that the antennas are blocked from each other. While an operator may be restricted to a single antenna type that can only be placed on a light pole (Figure 1), the design philosophy of providing numerous types of small cells, with the flexibility provided by different patterns shapes and gains, allows for a variety of placement locations (Figure 2).

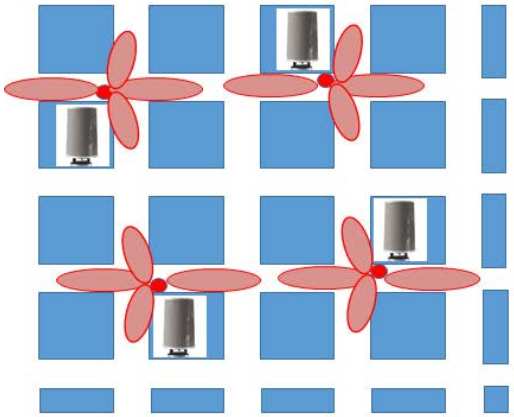

Figure 1 Network Layout Needing Adjustable Electrical DownTilt to Reduce Interference and Optimize Performance. AEDT reduces Small Cell coverage requiring more Antennas.

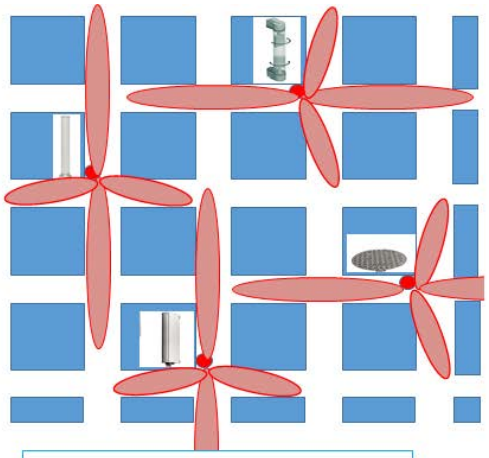

Figure 2 Network Layout Using Buildings to Isolate Small Cells to Reduce Interference and Optimize Performance. Fitting Antenna to the location allows better coverage and less Antennas.

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Although scenarios may vary in complexity, the general principle still applies. It is better to locate the small cell antenna in a position not requiring AEDT or power reduction of the radio. These location choices allow greater spacing between small cells, thus fewer antennas overall. While there are situations (very hilly terrain) that might benefit from AEDT, intelligent selection of the small cell location is generally the best solution. Due to their modest size, small cell antennas have lower gain and wide vertical 3-dB beamwidths as compared to larger macro cell antennas' high gain and narrow vertical 3-dB beamwidths. Therefore, the downtilt achieved by a small cell antenna has less effect than that of a macro cell. Downtilt is not a factor with Kathrein's award-winning Street Connect™ small cell antenna, as the antenna's beam comes up from the ground (the antenna is concealed as a manhole cover).

Since the general location for small cells is usually limited by site acquisition parameters, the variety of Kathrein small cell antennas allows placement on the side of a building, a telephone pole, a light post, or in the ground with Kathrein Street Connect™. This flexible approach is better than having a single antenna solution that depends on AEDT for downtilting to mitigate interference. Although Kathrein is a global leader in AEDT (and Remote Electrical Tilt (RET)) for macro solutions, the best path forward for small cells is to provide innovative and flexible solutions that accommodate intelligent site placement rather than requiring AEDT. For more information please visit www.kathreinusa.com.

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