



Improving high-band and low-band performance

In a test in a large Russian city, switching to CellMax antennas helped a carrier increase customers' network quality experience, increase traffic and increase revenues.

The carrier chose to swap 24 antennas from a western manufacturer with CellMax high gain antennas in one cluster formation with unswapped sites in-between and two standalone sites. Each antenna handled both the 2100 MHz network and the 2600 MHz LTE network, so there was a total of 48 sectors in the test. Both the original 18 dBi antenna and the 21 dBi CellMax antenna were the same in-placement length, 1.6m.

The goal: Increase capacity and throughput

The carrier's goal was to see if it could increase signal level and quality on both its 2100 MHz and 2600 MHz networks and hence grow capacity and throughput in the network.

Coverage and capacity in urban areas often come as a trade-off between the two, since increasing coverage can also increase interference. CellMax will in this project try to do both increasing coverage and lowering interference

Improved performance with CellMax

Pre-drive and post-drive tests were conducted. After the CellMax antennas were installed and given the correct tilt, the average improvement in 2100 MHz signal level was 1.6 dB (+45%) and the quality (E_c/I_o) improved by 0.6 dB (15%). For the 2600 LTE network, the difference was even greater, with an improvement in signal level 2.4 dB (74%) and quality (CINR) 2.8 dB (91%).

This increase in CINR for 2600 LTE meant that the carrier could use higher modulation coding schemes that increased data speed from 2.7 bits/second/Hertz to 3.9 bits/second/Hertz, an increase of 43% in throughput.

Despite the increase in signal level in the cluster and standalone sites, there was no decrease in quality in the neighboring sites. This means that the stronger signal did not increase interference outside of their cells.

KPIs improve across the board

After the swap, all measured KPIs improved. For the 2600 LTE network, total data use went up by 20%, as expected, with better coverage and throughput, since the faster and more accessible a network is, the more people will use it. Also, 2600 MHz coverage was extended

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indoors, so traffic was migrated from low band to high band. Connection attempts also increased by 13%.

Despite adding more users, including users deep indoors within a generally tougher radio environment, and more data, downlink speed increased by 4% and uplink speed by 7%. Drop rates for data connections also fell by 26%.

For 3G, the results were similar. Data traffic increased by 18% and voice traffic by 9%. Again, despite increased traffic, speed (throughput) went up by 5.5%. Call success rate also went up, while dropped calls went down.

Better quality, better business

From a business perspective, subscribers experienced an increase in network quality, improved indoor and outdoor coverage. With the increase in CINR, the network had more capacity, which the carrier could use to add more traffic and more subscribers and still improve the subscriber experience.

The increase in traffic also corresponded to an increase in revenue and led to a return on investment within about three months when swapping out an old antenna for a CellMax high-gain antenna. With a new roll-out, installing a CellMax antenna from the start, the return is even faster. This indicates that it's better to choose the right antenna from the start, especially since the installation cost can be higher than the price of the antenna.

In addition, since data traffic is what pays for the entire LTE investment – spectrum costs, MME, eNB, site construction, etc. – a 20% increase in LTE traffic speeds the entire Network ROI by 20%.

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