Importance of Antenna Alignment in 5G Networks

During the installation of a wireless network, antenna alignment counts. As mobile operators plan coverage objectives, it is critically important that antenna alignment is accurately implemented during cell site installation. Otherwise, it may result in coverage gaps, network performance degradation, and loss of revenue.

It is equally important that installers are equipped with an effective and reliable antenna alignment tool. This gives you the confidence that technicians will perform the job as indicated on the RF design specifications.

For years, the only way to perform antenna alignment was to use a compass. This method was time-consuming and, most of the times, inaccurate. Today, precision is even more important as we move into new technology, like 5G.

5G networks deployed in a small cell format utilize high-band mmWave beamforming to point signals in a specific direction in order to achieve higher quality and faster connections. Even minor distortions in the direction of the signals could affect KPIs. Mobile operators use 5G NR modeling software with advanced propagation models, complex antenna array, and full multi-technology capacity simulators. Failure to install per planned specification can lead to sub-optimal 5G network performance. Similarly, failure to identify near-field RF obstacles not identified by the 5G modeling software may render the cell unusable. To maximize high-band mmW frequencies and Massive MIMO beamforming antenna performance, precise antenna alignment and line-of-sight surveys are critical during installation.

Therefore, many mobile operators already require installers to use GPS-based antenna alignment tools and provide line-of-sight reports. These tools use satellite signals to accurately calculate azimuth, tilt, and roll, hence eliminating the guesswork.

VIAVI Solutions offers one of the leading instruments in this category. 3Z RF Vision Antenna Alignment Tool uses GNSS dual-frequency technology, which delivers accurate and fast antenna alignment readings (Azimuth, Tilt, and Roll) even in high-density urban environments. With a built-in

camera, it displays the line-of-sight view of the antenna on a five-inch touch screen display, while augmented reality is implemented to show a crosshair and bullseye, allowing for easy and precise alignment.

Report generation and sharing could not be easier. After correctly aligning the antenna using 3Z RF Vision's augmented reality and bullseye targeting system, technicians can simply save a PDF report and share it from a mobile device in real time. With accurate and reliable line-of-sight reports, engineers can optimize antenna orientations, avoiding unnecessary revisits.

It is also important to monitor and maintain alignment after installation. Many factors like improper handling, strong winds or natural disasters, may cause for antennas to move out of alignment, affecting network performance. Monitoring sensors like VIAVI IoA – IoT for Antennas can be easily attached to the back of antennas to monitor alignment remotely and avoid revisits.

Easy and accurate alignment not only helps reduce OPEX costs, it maximizes voice quality and data traffic, improves data user throughput and KPIs, and avoids customer churn.