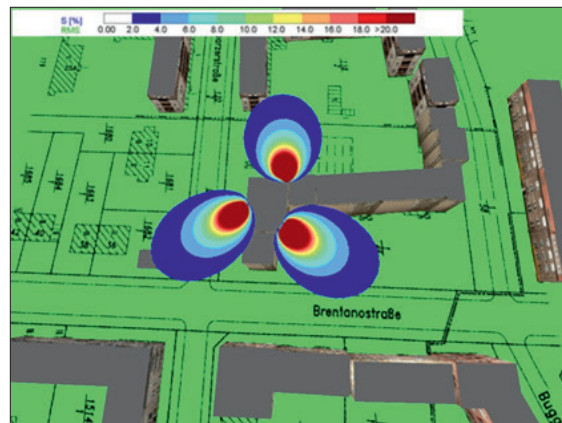# Function principle of SignalShark option 5G analyzer

In earlier mobile radio technologies such as GSM, UMTS and LTE, the base stations permanently transmitted a signal with their antennas. Often, for example, three mobile phone antennas were mounted on one mast, which then "illuminated" three sectors.


With mobile radio stations that support 5G with massive MIMO (beamforming), the base station initially only sends out a "rotating" broadcast signal, similar to a lighthouse. This allows end devices (e.g. a smartphone) to find the base station and connect to it. For the actual data communication, a beam is then directed from the base station directly to the end device, via which the traffic signal is transmitted.

Broadcast Signal:
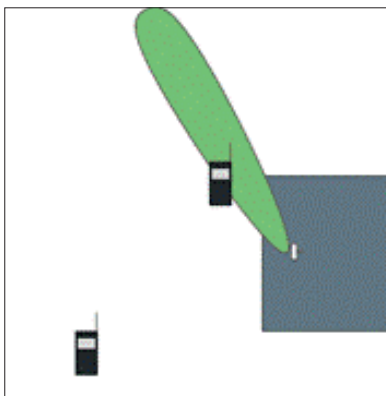
Traffic Signal:
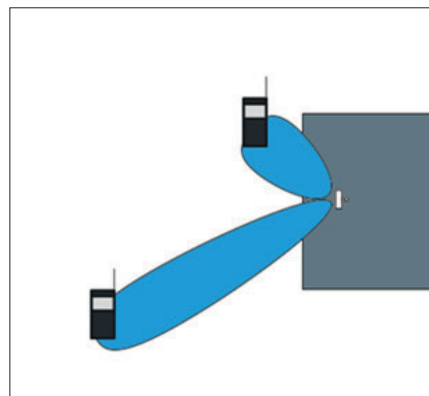
Unfortunately, the traffic signal has a different field strength than the broadcast signal. The beam also has a different shape (beam pattern). The task for regulatory authorities is to find out how high the maximum possible field strength emitted by the base station can be at a specific location. With 5G with Massive MIMO, as described above, this is now dependent on the presence of a communicating terminal device at this location.

Previously, the broadcast signal was measured and extrapolated to the maximum possible traffic signal using the different beam patterns. This requires a great deal of information about the base station and the antennas used.

In addition, all angles from the measuring antenna to the mobile radio antenna must be determined mechanically (including the mechanical and digital tilt of the antenna).This makes the measurement very time-consuming (up to several hours including obtaining information from the operator) and error-prone.
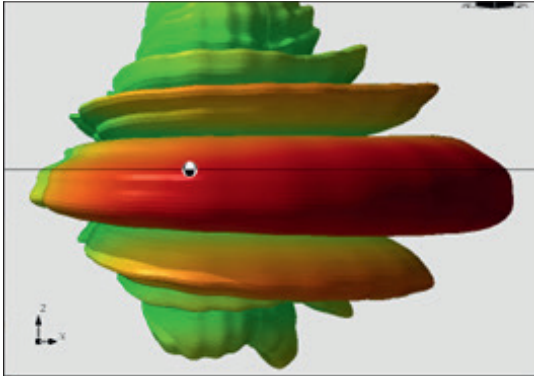
The following diagram shows the schematic process:
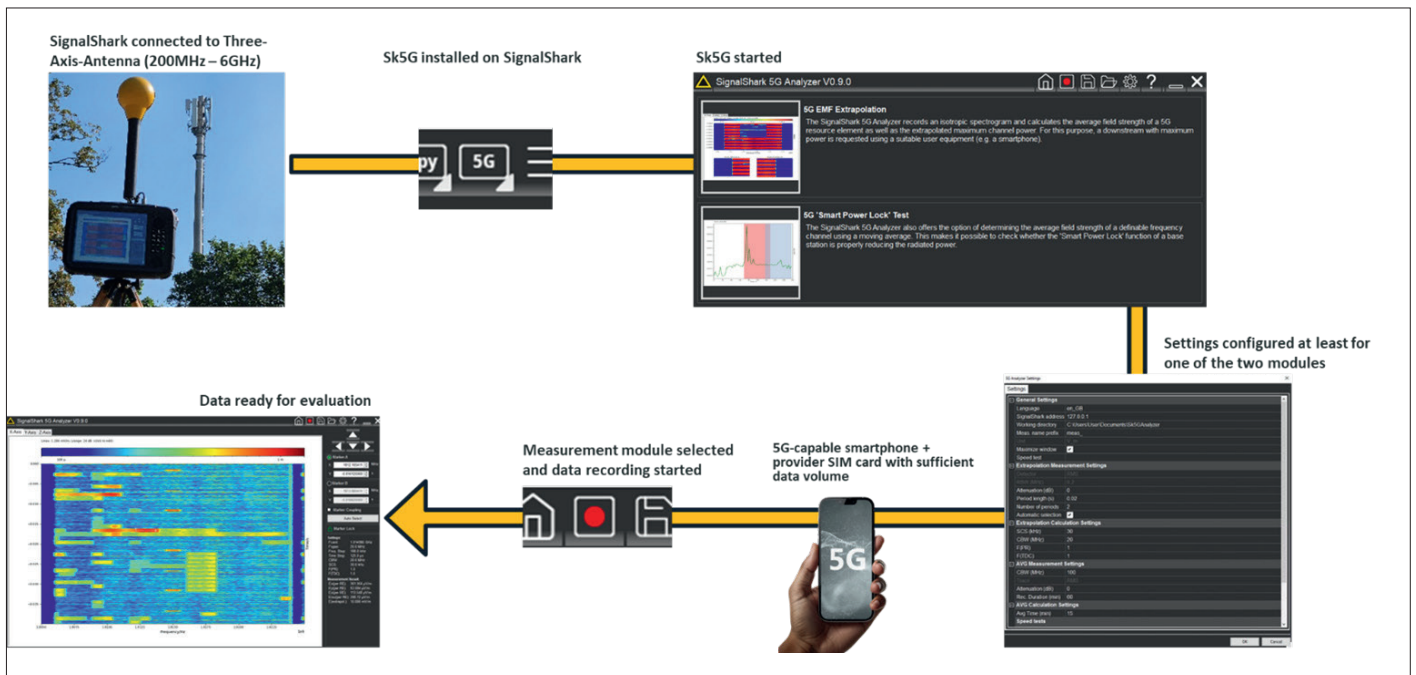
The software can also be used to start the speed test. To do this, a smartphone is connected to the SignalShark via USB 3.0 and the speed test is started automatically during the measurement.