Spectrum monitoring with the R&S®PR200 portable monitoring receiver/R&S®EM200 digital compact receiver

5G MEASUREMENTS IN 3D

The 5G challenge

To measure a 5G beam, you must know where it is, which frequency it is on and when it is active. In other words, you must consider 3 domains to achieve successful results. 5G base stations typically have no test port, so all measurements are performed over the air (OTA). Measuring 5G signals therefore requires new equipment and methods. The new R&S®PR200 portable receiver meets both these requirements – as does the compact R&S®EM200.

Frequency domain

Typical compliance measurements include center frequency, bandwidth and adjacent channel leakage. The leakage shown in Fig. 2 (discovered while scanning with R&S®PR200) was over 120 MHz wide.

Time domain

The gated spectrum application (referenced to GNSS) lets you synchronize perfectly with the frame timing of a 5G signal. Fig. 3 shows that the base station uses 7 SSB beams. The time gate is positioned on beam 6. The spectrum is only calculated during the gate, i.e. only the spectrum of this beam is displayed. The R&S®PR200 was located in the center of beam 6. Fig. 4 is zoomed to SSB 6 and shows an average power measurement for this beam. RMS and peak power can also be measured.

Space domain

In Fig. 5, the R&S®PR200 is mapping the SSB beams from three 5G base stations mounted on the same tower. This indicates how a 5G mobile would "see" the beams.

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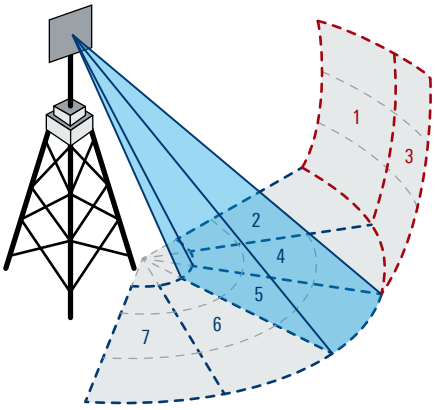
Fig. 1: SSB beam sequence
Frequency, time and space domains



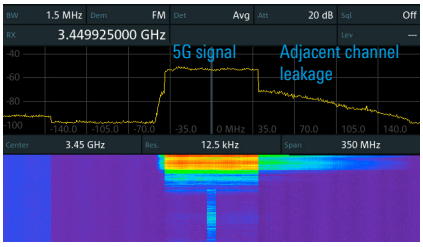


Fig. 2: 5G signal and adjacent channel leakage

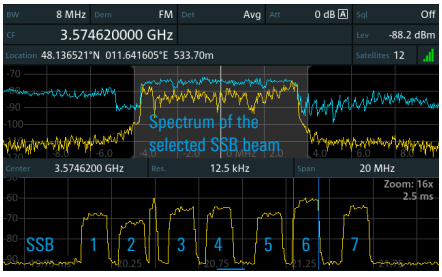


Fig. 3: Spectrum (top) of the SSB beam selected on the time axis (bottom)

Fig. 4: Average power measurement

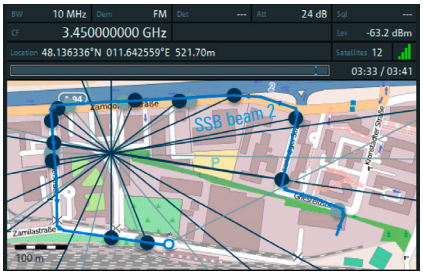


Fig. 5: Geographical mapping of SSB beams

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