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Base Station Over-the-Air Testing in Reverberation Chamber

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Abstract—Base station conformance and performance testing is traditionally carried out in a conducted manner, i.e. test instruments are connected via cables to physical ports on the base station. In this way, the quality of the output signal is assessed. Various metrics need to be measured and the levels comply with requirements in standard specifications. As the complexity of the base station transceiving circuitry increases and more and more antennas are added to the transceiving links, new measurement techniques are needed to capture the true performance. This is especially important for base stations for the new emerging 5G standard, where a very large number of antennas and new technologies such as massive MIMO and active antenna systems will be used for the signal transmission and reception. The conducted testing will not show the true radio frequency performance when several transceivers are used to combine the signal i n the air interface. For these systems, it might not either be possible to incorporate physical ports on the base station to which test equipment can be connected. Thus, Over-the-Air testing will be needed, where the signals are transmitted and received over the antenna interface. It is important that such test methods are time and cost effective, in order not to significantly increase the test efforts compared to today. The reverberation chamber is a good candidate for these tests, given its low test time and test setup complexity. The reverberation chamber is already a frequently and well-proven tool in the wireless industry to assess performance of user equipment and the extension to base station testing is straightforward. This paper elaborates on the feasibility of the reverberation chamber for base station Over- the-Air testing. Several key parameters are measured and compared to results from conducted testing, showing that the metrics currently measured in conducted mode can be translated to Over-the-Air metrics with high accuracy. In addition, an analysis of major uncertainty contributions is provided. This analysis shows that there is insignificant impact on the measurement accuracy when measuring antennas with high gain.

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