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**Passive intermodulation test methods of array
antenna systems in mobile communication
systems**

Recommendation ITU-T K.149

ITU-T

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Passive intermodulation test methods of array antenna systems in mobile communication systems

Summary

Recommendation ITU-T K.149 specifies methods for measuring the passive intermodulation level of array antenna systems in mobile communication systems, including test equipment and test procedures.

This Recommendation covers the following frequency ranges, but is not limited to the following ranges: LTE 700, APT 700, LTE 800, Cellular 850, E-GSM 900, DCS 1800, PCS 1900, AWS 1700/2100, UMTS 2100 and LTE 2600 operating bands.

History

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Introduction

With the development of mobile communications, the data carried in the fixed bandwidth has increased rapidly. There are many signals of different frequencies in the same transmission medium. Since the transmission medium has certain nonlinear characteristics, when two or more signals with multiple different frequencies are mixed into the passive components, intermodulation products of different amplitudes are produced at other frequencies. This is called passive intermodulation (PIM).

Passive components include antennas, radio frequency (RF) feeders, connectors, filters, diplexers, directional couplers, RF termination loads, and attenuators, etc. When the passive intermodulation falls within the receiving band of a base station, the sensitivity of the receiver is reduced, resulting in a decrease in the quality of the call or the carrier-to-interference ratio (C/I) of the system.

With the gradual large-scale commercialization of 4G LTE and 5G networks, the number of communication systems and the number of users have greatly increased. Therefore, the design of communication systems requires the use of limited spectrum resources to be as efficient as possible, and passive intermodulation distortion becomes an important factor limiting the system capacity. Massive multi-input multi-output (MIMO) antennas are key technologies in the 5G era, and more post-stage passive components will be introduced, thus bringing more challenges to R&D and testing. In order to reduce this interference, it is very important to perform strict PIM testing on passive components during their production.

This Recommendation provides a reference for the passive intermodulation (PIM) level measurement of array antennas in mobile communication systems.