BROADBAND DIFFERENTIAL FED INTEGRATED ANTENNA

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寬頻差動綜合天線

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Abstract

Modern ICs used in mobile communications nowadays use differential (balanced) signals for high-speed data transmission. Use of differential signals reduces common-mode interference in particular those due to radiation, thus giving better immunity. The use of differential signals has extended to RF, however the RF front ends usually use a balun to convert the balanced signal to an unbalanced signal for amplification or to drive a normal single-ended antenna for radiation. One of the reasons for this is that most front-end components are designed with single ended terminals.

Past works show that the push-pull configuration combined with a differential feed antenna can eliminate the need of a balun. However, these previous works can only operate over narrow bands which are not suited for today’s broadband mobile communication systems, or future systems that may use software defined radios. The work presented in this thesis uses the push-pull distributed amplifier integrated with a broadband antenna to realize an active integrated antenna. This integrated antenna not only provides broadband amplification, but also directly combines the differential output signal in space.

The research work presented in this thesis show that a broadband differential fed
integrated antenna with signal combination in space can be realized. The resultant integrated antenna can give a gain of about 13dBi from 0.9GHz to 2.3GHz with a 2\textsuperscript{nd} harmonic suppression of around 30dB. This integrated antenna configuration can improve the efficiency as well as simplifying the front-end of a wideband mobile unit and is all achieved without the need of baluns.
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