Title: ACPR Definition Amendment to <Proposal for "UTRA RF Front-End Key Characteristics" for IMT.RKEY>.

Source: Hewlett Packard Ltd

Introduction

This document proposes two amendments to ETSI L1-EG Tdoc 44/99 <Proposal for "UTRA RF Front-End Key Characteristics" for IMT.RKEY> presented in at Meeting #10 in Espoo, Finland.

Proposal 1

With reference to Table 1 "RF Front-end Key Characteristics" on page 2, the 3dB bandwidth is specified as,

3 dB bandwidth (A1.2.5)	*4.1 MHz (8.2 MHz and 16.4 MHz for the higher chip rates)*	*4.1 MHz (8.2 MHz and 16.4 MHz for the higher chip rates)*

Considering that W-CDMA employs a root raised cosine filter, it is appropriate to define the 3 dB bandwidth as exactly equal to the chip rate. We propose that the above table entry is replaced by;

3 dB bandwidth (A1.2.5)	*Exactly equal to the chip rate. (4.096, 8.192 or 16.384 MHz)*	*Exactly equal to the chip rate. (4.096, 8.192 or 16.384 MHz)*

Proposal 2

With reference to section **5.4.1.3.3 ACP (Adjacent Channel Protection) (A1.2.15)**, the text currently reads;

"*Adjacent channel protection (ACP) is the ratio of the transmitted power and the power measured after a receiver brick wall filter in the adjacent RF channel.*"

We propose that this text is amended to read;

"*Adjacent channel protection (ACP) is the ratio of the transmitted power to the power measured after a receiver filter in the adjacent RF channel. Both the transmitted power and the received power are measured within a filter response that is nominally rectangular, with a noise power bandwidth equal to the chip rate.*"

Background

As we understand it, the definition of adjacent channel protection is intended to reflect the amount of (unwanted) power due a transmission in one RF channel, that appears at the input of the decision circuits of a receiver in an adjacent RF channel; that is, after the receiver's filtering.

In the case of W-CDMA, the bandwidth defining filter is the receiver's root raised cosine filter.

In view of this, the adjacent channel measurement filter could be defined as a root raised cosine filter, but this introduces (arguably) unnecessary complexity to the measurement because the measuring instrument is required to apply a precise filter weighting.

Alternatively, we can observe that a band-pass root raised cosine filter has an equivalent noise bandwidth equal to the chip rate, and so we can define the measurement filter more simply; as a nominally rectangular filter with a noise bandwidth equal to the chip rate.

Strictly speaking this approximation does make some assumptions about the uniformity of the noise power density across the filter band edges, which will introduce a small theoretical discrepancy between the noise power as would be "seen" by an idealized root cosine filtered receiver and the noise power measured through the rectangular measurement filter.

This error is very small (typically < 0.01 dB) for practical noise spectra such as flat noise, 1/f or linear sloped noise.

A second issue lies in the fact that we also propose the same measurement filter bandwidth in the main channel.

This is simply established convention in ACP measurement, it is the way almost all general purpose ACP functions work. (The uniformity provides some advantage in implementation.)

However, it should be noted that in doing this we are excluding the power in the tails of the transmitted root raised cosine power spectrum. Those making measurements might be interested to know that for an α = 0.22 RRC spectrum the transmitted power measured in this bandwidth is nominally 0.177 dB lower than the total transmitted power.

Considering that the primary objective is to define a standard method for ACP measurement, we suggest that these are minor discrepancies, and are of academic interest only.