Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Averaging equation for CINR
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Re:	IEEE 802.16e-2005
Abstract	Specify an averaging equation to calculate the mean CINR statistics over multiple measurements
Purpose	Adopt proposed changes
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Averaging equation for CINR

Introduction

Currently in Section 8.4.11.3:

"The mean CINR statistic (in dB) shall be derived from a multiplicity of single messages using Equation

$$\hat{m}_{CINR,dB}[k] = 10\log(\hat{m}_{CINR}[k]) \quad (145).$$

where

$$\hat{m}_{CINR}[k] = \begin{cases} CINR[0] & k = 0 \\ (1-a_{avg})\hat{m}_{CINR}[k] + a_{avg}CINR[k] & k > 0 \end{cases} \quad (146)$$

CINR[k] is a linear measurement of CINR (derived by any mechanism which that delivers the prescribed accuracy) for message k; and α_{avg} is an averaging parameter specified by the BS).

In the above equation, any measurement will decay exponentially according to increasing message index, not time index. When the measurements are uniformly spaced, the equation gives recursive running average as intended. However, when the measurements are not uniformly spaced, the equation will not decay the previous measurements even though they can be fairly outdated. Therefore, the average CINR reporting will not be able to reflect the correct channel condition. This can be a problem in fast link adaptation.

Non-uniform measurement can occur when the MS is required to report CINR based on dedicated pilot over frames in which some frames may not contain any allocation to the MS.

Proposed changes

~~Add the paragraph before the last line of page 641 of section 8.4.11.3:~~

Modify the text of last paragraph in page 641 as followings:

---------- Begin ----------

When the SS is required to measure CINR for handover, t~~T~~he mean CINR statistic (in dB) shall be derived from a multiplicity of single messages using Equation

$$\hat{}_{CINR,dB}[k] \quad 10\log \quad _{CINR}[k] \quad (145)$$

where

$$\hat{}_{CINR}[k] \quad \begin{cases} CINR[0] & k \quad 0 \\ (1 \quad _{avg})\hat{}_{CINR}[k \quad 1] \quad _{avg}CINR[k] & k \quad 0 \end{cases} \quad (146)$$

~~*k* is the time index for the message (with the initial message being indexed by *k* = 0, the next message by *k* = 1, etc.);~~ CINR[*k*] is a linear measurement of CINR (derived by any mechanism ~~which~~ that delivers the prescribed accuracy) for message *k*; and $_{avg}$ is an averaging parameter specified by the BS.

For CINR report via CQICH, REP-RSP, and Feedback Header for link adaptation, the MS shall derive mean CINR (in dB) using Equation

$$\hat{}_{CINR,dB}[k] \quad 10\log \quad _{CINR}[k] \qquad (145a)$$

where

$$\hat{}_{CINR}[k] \quad \begin{array}{ll} CINR[0] & k \quad 0 \\ (1 \quad _{avg})^{n} \ \hat{}_{CINR}[k \quad 1] \quad 1 \quad (1 \quad _{avg})^{n} \ CINR[k] & k \quad 0 \end{array} \qquad (146a)$$

CINR[*k*] is a linear measurement of CINR for the *k-th* measurement; and *n* is number of consecutive frames in which no measurement is made. In frames where no measurement is made, the SS shall report the latest averaged results.

To solve for the standard deviation, the expectation-squared statistic shall be updated using Equation (147).

---------- End ----------