

Agenda item: Corrections to Release 99 specifications
Source: Nokia
Title: CR 25.215-070: Clarification of UTRAN SIR measurement
Document for: Decision

1. Introduction

The SIR measurement definition needs following corrections:

- The definition should clarify that the SIR measurement is unbiased.
- The definition that only non-orthogonal part of the measurement is included in the ISCP measurement, is not sensible in uplink, and thus should be deleted.

These issues are explained further below.

2. Unbiased SIR measurement

We think that it is important that different NodeBs use the same kind of SIR measurement method, since otherwise the performance optimisation is impossible in soft handover. For this reason, we think it should be clarified whether SIR measurement is so called biased measurement or unbiased measurement.

Since unbiased measurement helps to optimise the performance, we propose to define the SIR measurement to be unbiased.

What does bias mean?

- Bias means that the average value of the measurement is not correct. Variance of the measurement can be removed by averaging the E_b/N_0 measurement. The remaining difference between the average measured value and the correct value is bias.

Why is there a bias?

- Part of the noise + interference power can be seen in $E_b \Rightarrow E_b$ is biased too high. The reason is that we calculate the power ($=^2$) and if there is any variance in the E_b measurement, the squared value will be biased too high.

- The amount of bias depends on the number of allocated Rake fingers. Each Rake finger "collects" the same amount of bias. The amount of bias per Rake finger depends on the number of pilot symbols and on the power of the pilot symbols compared to the noise.

Why is the bias a problem?

- Where do we need the absolute correct E_b/N_0 value because the outer loop will compensate any bias? A few reasons:

- The correct E_b/N_0 value is needed in RNC if we would like to estimate uplink loading based on the outer loop E_b/N_0 targets.

- In soft handover the same E_b/N_0 target should be used by both base stations. If the bias in the E_b/N_0 estimation is different between the base stations, the uplink performance in SHO is degraded.
- In the beginning of the call the correct E_b/N_0 value would be good to use.
- Unbiased E_b/N_0 estimation is also beneficial for the base station receiver performance itself: since the bias depends on the number of allocated Rake fingers, any allocation or release of a finger could cause problems in the receiver.

How to remove the bias?

- The bias can be removed because we know the interference + noise power, and we know how much of that power is leaking to the E_b measurement.

3. ISCP definition

In the UTRAN SIR measurement definition it is defined, that only nonorthogonal part of interference power should be measured. In practice, however, the interference in uplink is mainly nonorthogonal, so is this sentence actually needed.

Thus we propose to delete the corresponding sentence from UTRAN SIR measurement.

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.215 CR 070

Current Version: **3.3.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **TSG-RAN #9**
list expected approval meeting # here ↑

for approval **X**
for information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: Nokia **Date:** 2000-08-08

Subject: Clarification of UTRAN SIR measurement

Work item:

Category: F Correction **Release:** Phase 2
(only one category shall be marked with an X) A Corresponds to a correction in an earlier release Release 96
B Addition of feature Release 97
C Functional modification of feature Release 98
D Editorial modification Release 99
Release 00

Reason for change: There are two corrections needed to be made for SIR measurement definition.
1) It should be defined that SIR measurement is unbiased.
2) The definition that interference measurement should include only non-orthogonal part of the interference, should be deleted.

Clauses affected: 5.2.2

Other specs affected: Other 3G core specifications → List of CRs:
Other GSM core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:

5.2 UTRAN measurement abilities

The structure of the table defining a UTRAN measurement quantity is shown below.

Column field	Comment
Definition	Contains the definition of the measurement.

5.2.1 RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the UTRAN uplink carrier channel bandwidth in an UTRAN access point. The reference point for the RSSI measurements shall be the antenna connector.
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5.2.2 SIR

Definition	<p>Signal to Interference Ratio, is defined as: $(RSCP/ISCP) \times SF$. Measurement shall be performed on the DPCCH after RL combination in Node B. In compressed mode the SIR shall not be measured in the transmission gap. The reference point for the SIR measurements shall be the antenna connector.</p> <p>where:</p> <p>RSCP = Received Signal Code Power, <u>unbiased measurement of</u> the received power on one code.</p> <p>ISCP = Interference Signal Code Power, the interference on the received signal. Only the non-orthogonal part of the interference is included in the measurement.</p> <p>SF=The spreading factor used on the DPCCH.</p>
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5.2.3 Transmitted carrier power

Definition	Transmitted carrier power, is the ratio between the total transmitted power and the maximum transmission power. Total transmission power is the mean power [W] on one carrier from one UTRAN access point. Maximum transmission power is the mean power [W] on one carrier from one UTRAN access point when transmitting at the configured maximum power for the cell. Measurement shall be possible on any carrier transmitted from the UTRAN access point. The reference point for the transmitted carrier power measurement shall be the antenna connector. In case of Tx diversity the transmitted carrier power for each branch shall be measured.
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5.2.4 Transmitted code power

Definition	Transmitted code power, is the transmitted power on one channelisation code on one given scrambling code on one given carrier. Measurement shall be possible on the DPCCH-field of any dedicated radio link transmitted from the UTRAN access point and shall reflect the power on the pilot bits of the DPCCH-field. When measuring the transmitted code power in compressed mode all slots shall be included in the measurement, e.g. also the slots in the transmission gap shall be included in the measurement. The reference point for the transmitted code power measurement shall be the antenna connector. In case of Tx diversity the transmitted code power for each branch shall be measured and summed together in [W].
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