**TSG RAN Meeting #21** **RP-030422**
**Frankfurt, Germany, 16 - 19 September 2003**

**Title** **CRs (Rel-6) to TS 25.942 on "Methodology for coexistence studies of UTRA FDD with other radio technologies"**
**Source** **TSG RAN WG4**
**Agenda Item** **8.1.4**

| RAN4 Tdoc | Spec | CR | R | Cat | Rel | Curr Ver | Title | Work Item |
|---|---|---|---|---|---|---|---|---|
| R4-020783 | 25.942 | 011 | 1 | F | Rel-6 | 6.0.0 | Methodology for coexistence studies of UTRA FDD with other radio technologies | RInImp-UMTS850 |

**3GPP TSG RAN WG4 (Radio) Meeting #28** **R4-030783**

**Sophia Antipolis, France 18 - 22 August 2003**

CR-Form-v7

# CHANGE REQUEST

⌘ **25.942** **CR** **011** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Methodology for co-existence studies of UTRA FDD with other radio technologies |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | RInImp-UMTS850 |
| ***Date:*** | ⌘ | 08/09/2003 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-6 |

*Use one of the following categories:*
***F*** *(correction)*
***A*** *(corresponds to a correction in an earlier release)*
***B*** *(addition of feature),*
***C*** *(functional modification of feature)*
***D*** *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

*Use one of the following releases:*

| | |
|---|---|
| *2* | *(GSM Phase 2)* |
| *R96* | *(Release 1996)* |
| *R97* | *(Release 1997)* |
| *R98* | *(Release 1998)* |
| *R99* | *(Release 1999)* |
| *Rel-4* | *(Release 4)* |
| *Rel-5* | *(Release 5)* |
| *Rel-6* | *(Release 6)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | Agreed simulation assumptions and parameters for UMTS850 WI as included in R4-030558 (based on the approved document T1P1.2/2003-052R2) are currently not captured in RAN WG4 related documentation for future reference. Furthermore, as some of this information (propagation models for 850 MHz, system parameters of other radio systems (GSM, IS-95, IS-136) used in co-existence studies) may be of more general applicability, it is proposed to add this information to 25.942. |
| ***Summary of change:*** | ⌘ | Simulation assumptions and parameters for other radio systems as described in R4-030558 are added within a new Chapter "Methodology for coexistence studies of UTRA FDD with other radio technologies". The changes are done in a format which will make it easy to add parameters for future frequency variants. |
| ***Consequences if not approved:*** | ⌘ | Agreed simulation assumptions and parameters for UMTS850 WI will be undocumented. |

| | | | | | |
|---|---|---|---|---|---|
| ***Clauses affected:*** | ⌘ | | | | |
| ***Other specs affected:*** | ⌘ | **Y** | **N** | | |
| | | | **X** | Other core specifications | ⌘ |
| | | | **X** | Test specifications | |
| | | | **X** | O&M Specifications | |
| ***Other comments:*** | ⌘ | | | | |

**How to create CRs using this form:**
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change reques

## 7.1 6.2.2.2 Calculation of multi operator capacity

Again following the definition of capacity in 2.1, the percentage of users with a C/I below the given threshold has to be calculated. Since C/I is a random value for each fixed $N_{multi}$ the simulation can lead to a number of cumulative distribution functions:

$$F_{C/I,N_{multi},N_{other}} = P(cir < CIR, N_{multi}, N_{other}).$$

$N_{other}$ is the mean number of active mobiles per cell in the adjacent interfering system. The objective of the simulation is to find the number $N_{multi}$ that fulfils the relation:

$$P(cir < threshold, N_{multi}, N_{other}) \leq 5\%$$

for a fixed number of $N_{other}$.

The procedure to determine $N_{multi}$ is done similar as described in 2.2.1:

1) calibrate the co-channel interference in the victim system;
2) place mobiles in victim and interfering system;
3) calculate best server in victim and interfering system;
4) control power in bothsystems;
5) calculate co-channel interference at perturbed station;
6) calculate adjacent interference at perturbed station;
7) do power control for perturbed station;
8) evaluate C/I;
9) remove all stations and continue with 2. Until a number of trials is reached;
10) calculate the CDF of C/I;
11) increase or decrease the number $N_{multi}$ and start again as long as the given outage probability is reached.

# 7 Methodology for coexistence studies of UTRA FDD with other radio technologies

## 7.1 Introduction

This Section includes specific simulation assumptions and parameters for coexistence studies of UTRA FDD with other radio technologies (e.g. GSM, IS-95) for additional frequency bands such as e.g. the 850 MHz bands (Band V). Unless said otherwise, simulation methodologies and parameters from Section 5 shall apply.

## 7.2 Simulation layout

Fig. 16 shows the generic sectorized simulation layout and worst-case offset between the interfereing systems. For this case, the cell radius *R* is derived from the Inter-site distance ISD as *R = ISD/3*.

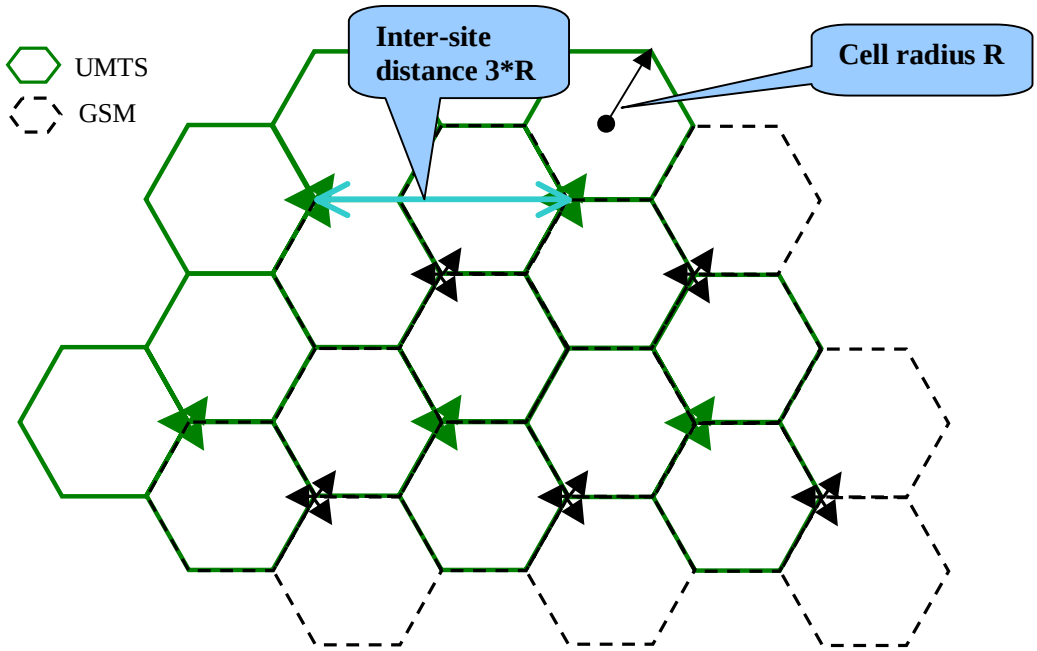


**Fig. 16. Simulation layout**

The following parameters shall be used in conjunction with this layout:

| Frequency variant | Inter-site Distance | Comment |
|---|---|---|
| 850 MHz | Urban: 1.6 km (R = 533 m)<br>Suburban: 3.2 km (R = 1067 m) | From R4-030558. |

| Radio technology / Frequency variant | Frequency re-use pattern | Comment |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 4/12, 36 sites | From R4-030558. |
| **IS-136** | | |
| 850 MHz | 7/21, 28 sites | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | 1, 16 sites | From R4-030558. |

## 7.3 Definition of the propagation models and related parameters

The following general parameters shall be used for UTRA FDD as well as other studied radio technologies:

| Frequency variant | Propagation model | Comment |
|---|---|---|
| 850 MHz | Urban:<br>40*(1-0.004*DHb)*LOG10(R)-18*LOG10(DHb)+21*LOG10(f)+80<br>Suburban:<br>40*(1-0.004*DHb)*LOG10(R)-18*LOG10(DHb)+21*LOG10(f)+71.7 | From R4-030558.<br>R denotes the distance in kilometers, f denotes the frequency (i.e., 850) in MHz and DHb denotes the BS antenna height in meters over average rooftop |

| Frequency variant | BS Antenna gain (including cable | Comment |
|---|---|---|

| | loss) | |
|---|---|---|
| 850 MHz | 12 dBi | From R4-030558. |

| Frequency variant | BS Antenna height (above rooftop level), Dhb | Comment |
|---|---|---|
| 850 MHz | Urban: 23.7 m<br>Suburban: 39.7 m | assumes rooftop height 12 m<br>assumes rooftop height 6 m<br><br>From R4-030558. |

| Frequency variant | MCL | Comment |
|---|---|---|
| 850 MHz | 70 dB | |

| Frequency variant | UE Antenna gain (incl. body losses) | Comment |
|---|---|---|
| 850 MHz | 0 dBi | |

## 7.4 Parameters for UTRA FDD frequency variants

All UTRA FDD related parameters and assumptions of Section 5 (for 2 GHz) shall apply also for these frequency variants, with the following exceptions. Furthermore, the chip rate is assumed to be 3.84 Mcps.

| Frequency variant | UL Eb/No target | Comment |
|---|---|---|
| 850 MHz | 6.1 dB | For 8 kbps speech.<br>Same as for 2 GHz in Sect. 5 |

| Frequency variant | DL Eb/No target | Comment |
|---|---|---|
| 850 MHz | 7.9 dB | For 8 kbps speech.<br>Same as for 2 GHz in Sect. 5 |

## 7.5 Parameters for other studied radio technologies

The following RF parameters shall be used for other studied radio technologies:

| Radio technology / Frequency variant | Maximum BS power at the antenna input | Comment |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 40 dBm | From R4-030558. |
| **IS-136** | | |
| 850 MHz | 37.5 dBm | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | 43 dBm | From R4-030558. |

| Radio technology / Frequency variant | BS max / min dedicated channel power | Comment |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 40 dBm / 10 dBm (TRX) | |
| **IS-136** | | |

| | | |
|---|---|---|
| 850 MHz | 37.5 dBm / N.A. | |
| **IS-95/1X** | | |
| 850 MHz | 32 dBm / 26 dBm | From R4-030558. |

| **Radio technology / Frequency variant** | **MS max / min powers** | **Comment** |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 33 dBm / 5 dBm | From R4-030558. |
| **IS-136** | | |
| 850 MHz | 28 dBm / -8 dBm | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | 23 dBm / -52 dBm | From R4-030558. |

| **Power control** | **Power control margin** | **Comment** |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 5dB * | From R4-030558. |
| **IS-136** | | |
| 850 MHz | 15dB * | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | N.A. * | From R4-030558. |

* Stabilization algorithm same as for WCDMA (C/I based)

| **Radio technology / Frequency variant** | **UL Eb/No (or SINR) target** | **Comment** |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 6 dB SINR | From R4-030558. |
| **IS-136** | | |
| 850 MHz | 13 dB SINR | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | IS-95: 7 dB Eb/No for 9.6/14.4 kbps<br>1X: 4 dB Eb/No | From R4-030558. |

| **Radio technology / Frequency variant** | **DL Eb/No (or SINR) target** | **Comment** |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | 9 dB SINR | From R4-030558. |
| **IS-136** | | |
| 850 MHz | 17 dB SINR | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | IS-95: 7 dB Eb/No for 9.6 kbps<br>9 dB Eb/No for 14.4 kbps<br>1X: 5.5 dB Eb/No | From R4-030558. |

| **Radio technology / Frequency variant** | **BS noise floor / NF** | **Comment** |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | -113 dBm / 7 dB | From R4-030558. |
| **IS-136** | | |
| 850 MHz | -124 dBm / 5 dB | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | -108 dBm / 5 dB | From R4-030558. |

| Radio technology / Frequency variant | MS noise floor / NF | Comment |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | -111 dBm / 9 dB | From R4-030558. |
| **IS-136** | | |
| 850 MHz | -120 dBm / 9 dB | From R4-030558. |
| **IS-95/1X** | | |
| 850 MHz | -104 dBm / 9 dB | From R4-030558. |

| Radio technology / Frequency variant | UL loading | Comment |
|---|---|---|
| **GSM/GPRS** | | |
| 850 MHz | N.A. | |
| **IS-136** | | |
| 850 MHz | N.A. | |
| **IS-95/1X** | | |
| 850 MHz | IS-95: 6 dB, or 3.5 dB could also be analyzed<br>1X: 5.5 dB | From R4-030558. |