TSG RAN Meeting #24 **RP-040198**
Seoul, Korea, 2 - 4 June 2004

Title **CR (Rel-6) for WI "FDD BS Classification"**
Source **TSG RAN WG4**
Agenda Item **8.11**

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-040215	25.942	017		F	Rel-6	6.2.0	Minimum Coupling Loss for co-siting of different BS classes	RInImp-BSClass-FDD

3GPP TSG RAN WG4 (Radio) Meeting #31 R4-040215

Beijing, China 10 - 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘ 25.942 CR 017 ⌘rev ⌘ Current version: 6.2.0 ⌘

*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:	⌘	Minimum Coupling Loss for co-siting of different BS classes
Source:	⌘	RAN WG4
Work item code:	⌘	RInImp-BSClass-FDD
Date:	⌘	24/05/2004
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:	⌘	Requirements for spurious emissons and blocking for co-location are based on the assumption that BS belonging to the same class are co-located with minimum coupling loss of 30dB. In some cases of cositing of different BS classes a minimum coupling loss of 30dB is not sufficient. It must be increased by the maximum difference of the corresponding requirements for spurious emissions and blocking of the co-sited BS class therefore.
Summary of change:	⌘	Rationales and tables for additional required coupling loss in case of co-siting of FDD-GSM and FDD-FDD BS of different classes are added for reference.
Consequences if not approved:	⌘	Requirements for co-siting of different BS classes will remain ambiguous.

Clauses affected:	⌘	New clause 10.3

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 request.

10 Antenna-to-Antenna Isolation

10.1 Rationale for MCL value for co-located base stations

The coupling losses between two co-sited base stations are depending on e.g. the deployment scenario and BS antenna gain values. As seen from e.g. [28], different deployment scenarios give raise to a large variation in coupling loss values. However, in order not to have different requirements for different deployment scenarios, it is fruitful to use one value of the minimum coupling loss (MCL) representing all deployment scenarios.

For the case of two operators co-siting their antenna installations on a roof-top, the antennas could be situated in each other's far-fields and the isolation that occur between the sites can be analysed using the ordinary Friis' transmission equation:

$$\text{Isolation}\,[\text{dB}] = 20\log_{10}\left(\frac{2\pi R}{\lambda}\right) - \text{Gain}\,[\text{dBi}],$$

where R is the distance between the antennas, λ is the wavelength and Gain is the total effective gain of the two antennas.

When applying this equation to a deployment scenario with a separation distance of 10 meters between the two sites, both using 65^{o} (14 dBi) sector antennas, an isolation of about 30 dB occur when the antennas are situated in a 35^{o} angle compared to each other. This deployment scenario is regarded as typical to many co-sited antenna installations.

A coupling loss value of 30 dB also coincides with the minimum coupling loss value reported in [29] and one of the measured antenna configurations in [28]. It is also typical to many existing installations, as reported by several operators.

10.2 Rationale for MCL value for operation of base stations in the same geographic area

In general, unwanted emissions limits of base stations for coexistence are devided into requirements for operation in the same geographic area and co-located base stations. The requirements for operation in the same geographic area protect the victim mobile and the requirements for co-located base stations protect the victim base station.

Due to the spectrum arrangement of TDD and FDD, 3GPP defines in addition unwanted emission limits for TDD base stations for protection of the victim base station for operation in the same geographic area. In the same way as for co-located base stations, these additional limits are based on a specific MCL value between base stations. The assumed MCL values between base stations for operation in the same geographic area are explained below.

10.2.1 Wide Area and Geneal Purpose Base Station

It is assumed that the Wide Area and General Purpose BS is mainly deployed in Micro and Macro Environments. Due to the low receiver noise floor of the Macro base station, it is assumed that the Macro BS to Macro BS interference scenario is the most critical situation. That means eventhough the coupling loss for Micro BS to Micro BS or Macro BS to Micro BS may be lower, the desensitisation of the Micro BS would lead to less demanding requirements.

The following scenario is captured in chapter 7.4.1.2.1.3 BS-to-BS propogation model:

87 dB Pathloss (288 m Line-of-sight)

+13 dB TX antenna gain

+13 dB RX antenna gain

-6 dB Reduction in effective antenna gain due to antenna tilt

= 67 dB MCL

A MCL of 67 dB is considered as the reference scenario for Macro BS to Macro BS interference for operation in the same geographic area.

For the adjacent channels, where the ACLR requirement applies, an increase of 7 dB for the MCL is assumed, that means a MCL of 74 dB. The increase in MCL is justified by the lower number of interfering base stations, if only adjacent carriers are considered. Further, if the adjacent channels are controlled by the same operator, the carriers may not be deployed in the same hierarchical cell layer in proximity. Note that a requirement for adjacent carriers based on a MCL of 74 dB between Macro base stations may be as well used for Macro base stations with a MCL of 67 dB, if a higher desensitisation of the victim base station is acceptable. I. e. for FDD Macro base stations with a MCL of 67 dB instead of 74 dB the desensitisation would be 3 dB instead of 0.8 dB.

10.2.2 Local Area Base Station

It is assumed that the Local Area is deployed in Pico Environments. Due to the low receiver noise floor of the Macro base station, it is assumed that the Pico BS to Macro BS interference scenario is the most critical situation. That means eventhough the coupling loss for Pico BS to Pico BS or Pico BS to Micro BS may be lower, the desensitisation of the Micro and Pico BS would lead to less stringent requirements.

The Pico BS is similar to a mobile in respect to output power, antenna gain and antenna heights. Therefore for the Pico BS to Macro BS, the same MCL as for the UE to Macro BS is assumed. I. e. a MCL of 70 dB is considered as the reference scenario for Pico BS to Macro BS interference for operation in the same geographic area.

For the adjacent channels, where the ACLR requirement applies, an increase of 7 dB for the MCL is assumed, that means a MCL of 77 dB. The increase in MCL is justified by the lower number of interfering base stations, if only adjacent carriers are considered. Note that a requirement based on a MCL of 77 dB between Pico and Macro base station may be as well used for base stations with a MCL of 70 dB, if a higher desensitisation of the victim base station is accepted. I. e. for FDD Macro base stations with a MCL of 70 dB instead of 77 dB to Pico base stations the desensitisation would be 3 dB instead of 0.8 dB.

For the adjacent channels, where the ACLR requirement applies and the carrier separation is 5 MHz or less, an additional increase of 10 dB for the MCL is assumed, that means a MCL of 87 dB. The increase in MCL is justified by the fact that Local Area base stations will be deployed indoors or significantly below roof top. In these scenarios it may possible to increase the MCL by some adjustment (e.g. deployment around the corner or in the next room). Further, if the adjacent channels are controlled by the same operator, the carriers may not be deployed in the same hierarchical cell layer in proximity. The additional 10 dB assume a typical indoor to outdoor penetration loss.

10.3 Rationale for MCL values for co-sited base stations of different classes

The requirements for co-location of base stations assume 30dB minimum coupling loss between base stations of the same class. However, even if the requirements for the BS classes have been derived based on specific deployment assumptions for each class, a co-siting of different classes cannot be excluded. Due to the relaxed requirements for spurious emissions and blocking for the Medium Range and Local Area BS a coupling loss of 30 dB is not sufficient to enable co-existence in case of co-siting of different classes. Therefore, if BS's of different classes are co sited, the coupling loss of 30 dB assumed for co-location must be increased by the maximum difference between the corresponding limits of spurious emissions and blocking for the co-sited BS classes. The corresponding additional coupling loss values to be added to the 30 dB coupling loss for co-location are listed in table 10.1 and table 10.2.

Table 10.1: Required additional coupling loss for co-siting of different FDD and GSM BS classes

FDD BS class	Co-sited system					
	Macro BTS		Micro BTS		Pico BTS	
	GSM850/ GSM900	DCS1800/ PCS1900	GSM850/ GSM900	DCS1800/ PCS1900	GSM850/ GSM900	DCS1800/ PCS1900
Wide Area BS	0 dB *	0 dB *	0 dB	0 dB	0 dB	0 dB
Medium Range BS	19 dB	11 dB	0 dB *	0 dB *	0 dB	0 dB
Local Area BS	28 dB	20 dB	21 dB	16 dB	0 dB *	0 dB *

Note: co-location of BS of same class is included here for completeness

Table 10.2: Required additional coupling loss for co-siting of different FDD BS classes

FDD BS class	Co-sited FDD BS class		
	Wide Area BS	Medium Range BS	Local Area BS
Wide Area BS	0 dB *	10 dB	22 dB
Medium Range BS	10 dB	0 dB *	14 dB
Local Area BS	22 dB	14 dB	0 dB *

Note: co-location of BS of same class is included here for completeness

11 Modulation accuracy