TSG RAN Meeting #16 **RP-020288**
Marco Island, FL, USA, 4 - 7 June 2002

Title **CRs (R'99 and Rel-4/Rel-5 Category A) to TR 25.942**
Source **TSG RAN WG4**
Agenda Item **7.4.3**

RAN4 Tdoc	Spec	Curr Ver	New Ver	CR	R	Cat	Ph	Title	Acronym
R4-020828	25.942	3.2.0	3.3.0	7		F	R99	Antenna-to-antenna isolation for application in the same geographic area	TEI
R4-020829	25.942	4.1.0	4.2.0	8		A	Rel-4	Antenna-to-antenna isolation for application in the same geographic area	TEI

3GPP TSG RAN WG4 Meeting #23 **R4-020828**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.942** **CR** **7** ⌘ ev **-** ⌘ Current version: **3.2.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Antenna to antenna isolation for application in the same geographic area
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**F**
Release:	⌘	R99

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)*

Reason for change:	⌘	Addition of system scenarios for antenna to antenna isolation for application in the same geographic area.
Summary of change:	⌘	Addition of reference coupling loss between base stations for application in the same geographic area.
Consequences if not approved:	⌘	Reference scenarios for the requirement in the core specifications are unclear.

Clauses affected:	⌘	10
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications ⌘
Other comments:	⌘	**Equivalent CRs in other Releases: CR8 cat. A to 25.942 v4.1.0**

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 General Purpose Base Station

It is assumed that the 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.

3GPP TSG RAN WG4 Meeting #23 **R4-020829**

Gyeongju, Korea 13th -17th May, 2002

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CHANGE REQUEST

⌘ **25.942** **CR** **8** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

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Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**A**
Release:	⌘	Rel-4

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Other comments:	⌘	**Equivalent CRs in other Releases: CR7 cat. F to 25.942 v3.2.0**

10 Antenna-to-Antenna Isolation

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