

S4.02B V1.0.1 (<1999-04>)

Technical Specification

**3rd Generation Partnership Project (3GPP);
Technical Specification Group (TSG) RAN WG4;
UTRA (BS) TDD; Radio transmission and Reception**

3GPP



Reference

<Workitem> (<Shortfilename>.PDF)

Keywords

<keyword[, keyword]>

3GPP

Postal address

Office address

Internet

secretariat@3gpp.org
Individual copies of this deliverable
can be downloaded from
<http://www.3gpp.org>

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

©
All rights reserved.

Contents

Intellectual Property Rights	5
1 Scope	6
2 References	6
3 Definitions, symbols and abbreviations	6
3.1 Definitions.....	6
3.2 Symbols.....	7
3.3 Abbreviations.....	7
4 General.....	8
4.1 Measurement uncertainty	8
4.2 Base station classes.....	8
5 Frequency bands and channel arrangement.....	9
6 Transmitter characteristics	10
6.1 General.....	10
6.2 Base station maximum output power	10
6.2.1 Minimum Requirement.....	10
6.3 Base station output power	10
6.4 Frequency stability.....	10
6.4.1 Minimum Requirement.....	10
6.5 Output power dynamics	10
6.5.1 Closed loop power control	10
6.5.2 Power control steps	10
6.5.2.1 Minimum Requirement.....	11
6.5.3 Power control dynamic range	11
6.5.3.1 Minimum Requirement.....	11
6.5.4 Minimum transmit power.....	11
6.5.4.1 Minimum Requirement.....	11
6.5.5 Total power dynamic range.....	11
6.5.5.1 Minimum Requirement.....	11
6.5.6 Power control cycles per second.....	11
6.5.6.1 Minimum Requirement.....	11
6.5.7 Perch channel power	11
6.6 Transmit ON/OFF ratio	12
6.6.1 Minimum Requirement.....	12
6.7 Output RF spectrum emissions.....	12
6.7.1 Occupied bandwidth	12
6.7.2 Out of band emission.....	12
6.7.2.1 Spectrum emission mask.....	12
6.7.2.2 Adjacent Channel Leakage power Ratio (ACLR).....	12
6.7.2.2.1 Minimum Requirement.....	12
6.7.3 Spurious emissions.....	12
6.7.3.1 Minimum Requirement.....	13
6.8 Transmit intermodulation	13
6.8.1. Minimum Requirement.....	14
6.9 Modulation Accuracy	14
6.9.1 Minimum Requirement.....	14
7 Receiver characteristics	15
7.1 General.....	15
7.2 Reference sensitivity level.....	15
7.2.1 BS reference sensitivity level	15
7.2.2 Maximum Frequency Deviation for Receiver Performance.....	15
7.3 Dynamic range	15
7.4 Adjacent Channel Selectivity (ACS).....	15

7.5	Blocking characteristics	16
7.6	Spurious response	16
7.7	Intermodulation characteristics	16
7.8	Spurious emissions	16
8	Performance requirement	17
8.1	General	17
8.2	Dynamic reference sensitivity performance	17
8.2.1	Performance in AWGN channel	17
8.2.1.1	Single link performance	17
8.2.1.2	Multi link performance	17
8.2.2	Performance in multipath fading channels	18
8.2.2.1	Single link performance	18
8.2.2.1.1	Performance without TPC	18
8.2.2.1.2	Performance with TPC	18
8.2.2.2	Multi link performance	19
Annex A (normative): Transmit power levels versus time		20
Annex B (normative): Propagation conditions		20
Annex C (normative): Environmental conditions		20
History		21

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETR 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available **free of charge** from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://www.etsi.fr/ipr>).

Pursuant to the ETSI Interim IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETR 314 (or the updates on <http://www.etsi.fr/ipr>) which are, or may be, or may become, essential to the present document.

1 Scope

This document establishes the minimum RF characteristics of the TDD mode of UTRA. ~~<editor the current version only covers the BS (mobile station aspects)>~~

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ————— Reference 1

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the definitions apply.

Power Setting -	The value of the control signal, which determines the desired transmitter, output Power. Typically, the power setting would be altered in response to power control commands
Maximum Power Setting -	The highest value of the Power control setting which can be used.
Maximum output Power	This refers to the measure of power when averaged over the transmit timeslot at the maximum power setting.
Peak Power -	The instantaneous power of the RF envelope which is not expected to be exceeded for [99.9%] of the time.
Maximum peak power -	The peak power observed when operating at a given maximum output power.
Average Power -	The average transmitter output power obtained over any specified time interval, including periods with no transmission. <i><Editors: This definition would be relevant when considering realistic deployment scenarios where the power control setting may vary. ></i>
Maximum average power	The average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting. <i><Editors: The average power at the maximum power setting would also be consistent with defining a long term average power></i>

3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

<u>ACIR</u>	<u>Adjacent Channel Interference Ratio</u>
ACPLR	Adjacent e Channel L eakage P ower Ratio
ACS	Adjacent Channel Selectivity
BER	Bit Error Rate
BS	Base Station
CW	Continuous wave (unmodulated signal)
DL	Down link (forward link)
EIRP	<u>Equivalent-Effective</u> Isotropic Radiated Power
FDD	Frequency Division Duplexing
FER	Frame Error Rate
PPM	Parts Per Million
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference ratio
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment
UL	Up link (reverse link)
UTRA	UMTS Terrestrial Radio Access

4 StatusGeneral

The main objective of this section is to provide summary of the approval status of the various section of this document. The level of progress is defined as follows;

- ~~—No proposal exists~~
- ~~—A proposal(s) exists but no working assumption has been made~~
- ~~—A working assumption has been taken and the text contained in that section may have been update in line with that assumption~~
- ~~—This section is assumed to be finalised.~~

Section number	Section description	Status

4.1 Measurement uncertainty

The requirements given in this specification do not include measurement uncertainties related to conformance testing as used e.g. in regulatory testing or production testing. Conformance testing is specified in [reference to the appropriate document].

4.2 Base station classes

The requirements in this specification apply to base station intended for general-purpose applications.

In the future further classes of base stations may be defined; the requirements for these may be different than for general-purpose applications.

5 Frequency bands and channel arrangement

This section is identical to section 5 of S4.02A on “Frequency bands and Channel arrangement”.

~~5A Base station classes~~

~~The requirements in this specification apply to base station intended for general purpose applications.~~

~~In the future further classes of base stations may be defined; the requirements for these may be different than for general purpose applications.~~

6 Transmitter characteristics

6.1 General

Unless detailed the transmitter characteristic are specified at the antenna connector.

6.2 Base station maximum output power

~~Total power is the mean power delivered to a load with resistance equal to the nominal load impedance of the transmitter.~~

The maximum output power, P_{max}, of the base station is the mean power level per carrier that the manufacturers has declared to be available at the antenna connector.

6.2.1 Minimum Requirement

In normal conditions, The ~~total~~ base station maximum output power shall remain within +TBD dB and –TBD dB of the manufacturer’s rated power.

6.3 Base station output power

The output power, P_{out}, of the base station is the mean power of one carrier delivered to a load with resistance equal to the nominal load impedance of the transmitter during one slot.

6.4 Frequency stability

Frequency stability is ability of the BS to transmit at the assigned carrier frequency.

6.4.1 Minimum Requirement

The modulated carrier frequency ~~stability~~ of the BS shall be accurate to within $\pm [0.05]$ PPM for RF frequency generation.

6.5 Output power dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on the downlink.

6.5.1 Closed loop power control

Closed loop power control is the ability of the BS transmitter to adjust its output power in response to the UL received signal.

For closed loop correction on the Downlink Channel (with respect to the open loop estimate), the base station adjust its mean output power level in response to each valid power control bit received from the UE on the Uplink Channel.

6.5.2 Power control steps

The power control step is the minimum step change in the DL transmitter output power in response to a TPC message from the UE.

6.5.2.1 Minimum Requirement

Down link (DL) [1 - 3 dB]

Tolerance ffs.

<Need to define the transmitter power as “code domain power”. This is ffs.>

6.5.3 Power control dynamic range

The power control dynamic range is the difference between the maximum and the minimum transmit output power for a specified reference condition

6.5.3.1 Minimum Requirement

Down link (DL) power control dynamic range [x dB]

<Definition needs clarification.>

6.5.4 Minimum transmit power

The minimum controlled output power of the BS is when the power control setting is set to a minimum value. This is when the power control indicates a minimum transmit output power is required.

6.5.4.1 Minimum Requirement

Down link (DL) minimum transmit power [Maximum output power – 30dB]

<The maximum output power definition is ffs.>

6.5.5 Total power dynamic range

The power control dynamic range is difference between the maximum and the minimum transmit output power for a specified reference condition

6.5.5.1 Minimum Requirement

Down link (DL) total dynamic range [30 dB]

<This requirement is redundant, since 6.4.4 defines the same dynamic range by a minimum transmit power.>

6.5.6 Power control cycles per second

The rate of change for DL transmitter power control step.

6.5.6.1 Minimum Requirement

The rate of change for the DL transmitter power control step is as follows: [100 – 800] Hz.

The minimum rate of [100] Hz is to ensure that every frame is power controlled. The maximum rate may differ for open and closed loop power control.

6.5.7 Perch channel power

<The name and the use of the common control channel may need to be adapted, subject to WG1 definition.>

6.6 Transmit ON/OFF ratio

Transmit ON/OFF ratio is defined as the ratio of the maximum output transmit power within the channel bandwidth with the transmitter ON and OFF.

6.6.1 Minimum Requirement

The minimum requirement of transmitting ON/OFF ratio is [-x dBm /4.096MHz].

6.7 Output RF spectrum emissions

6.7.1 Occupied bandwidth

Occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated power for transmitted spectrum and is centered on the assigned channel frequency. The occupied channel bandwidth is less than 5 MHz based on a chip rate of 4.096 Mcps.

<Needs to be reviewed for the conformance specification.>

6.7.2 Out of band emission

Out of band emissions are unwanted emissions immediately outside the [channel] bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit can be specified in terms of a spectrum emission mask or adjacent channel power ratio for the transmitter.

6.7.2.1 Spectrum emission mask

The emission mask of the base station is an item for further study.

6.7.2.2 Adjacent eChannel Leakage power rRatio (ACPRACLR)

Adjacent eChannel Leakage power ratio-Ratio (ACPRACLR) is the ratio of the transmitted power from one carrier within a reference bandwidth of [4.096 MHz] to the power measured within a reference bandwidth of [4.096 MHz] centered on the adjacent(s) channel(s).

6.7.2.2.1 Minimum Requirement

BS channel	<u>ACPR</u> <u>ACLR</u> limit
± First adjacent channel	[] dBc
± Second adjacent channel	[] dBc

Table 4, BS ACPRACLR

Note

In order to ensure that switching transients do not degrade the ACPRACLR value the reference measurements conditions are an item for further study.

6.7.3 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the base station RF output port.

The frequency boundary and the detailed transitions of the limits between the requirement for out band emissions and spectrum emissions is an item for further study. Guidance can be taken from the applicable tables from ITU-R Recommendations SM.329,ERC Recommendations and regulatory input from other regions.

6.7.3.1 Minimum Requirement

{From ARIB Vol. 5; Section 6.1.1.4; Note: This ARIB content partly maps also on XX.06 sections 6.6.1 and 6.6.2, because of somewhat different definitions of spurious emissions.}

The spurious emission level against the mean output power of the base station in the Transmission band shall not exceed the limits specified below.

In the (a) Concerned Operator's System Bands and the (b) Other Bands Within Cellular Band, the spurious emission level within a [**]kHz bandwidth shall not exceed a level Specified in the Table 6.1.1.4-2. In the (c) Other Bands, the spurious emission level within a 1MHz bandwidth shall not exceed a level specified in the Table 6.1.1.4-2. Each transmission band is defined as follows:

- (a) Concerned Operator's System Bands: The bands of the concerned operator's system used for this CDMA system.
- (b) Other Bands Within Cellular Band: The 2.0G-band including other operator's cellular system bands, but excluding the (a) Concerned Operator's System Bands.
- (c) Other Bands: Other bands entirely consisting of all frequencies, but excluding the above bands (a) and (b).

Table 6.1.1.4-2. Spurious Emission Limits When Transmitting.

Measurement Band	Maximum Spurious Emission Level
Concerned Operator's System Bands	Shown the Adjacent channel leakage power in 6.1.1.3
Other Bands Within Cellular Band	-[**]dB/[**]kHz or [**] μ W(-[**]dBm)/[**]kHz, whichever the level is smaller.
Other Bands	If the mean transmission power is no more than 25W: [25 μ W(-16dBm)/1MHz or less.] If the mean transmission power is more than 25W: [-60dBc/1MHz or less, and 20mW(+13dBm)/1MHz or less.] [current rules in each country shall apply.]

6.8 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.8.1 ~~BS Intermodulation attenuation~~

The transmit intermodulation shall be defined by the ratio of the output power of subject transmitted signal to the output power of intermodulation product when an interference signal (that differs from frequency of subject signal) is added at a level [**]dB lower than that of the subject signal. The frequency of the interference signal shall be [**]MHz or more off the subject signal, however, as for interference signal whose frequency is in the range of 5MHz to 10MHz off the subject signal, adjacent channel leakage power is used instead of the output of intermodulation product.

6.8.1.4 Minimum Requirement

The Transmit intermodulation level against the mean output power per carrier of the base station shall not exceed the limits specified below.

[If the mean transmission power is no more than 25W : 25 μ W(-16dBm) / 1MHz or less.]

[If the mean transmission power is more than 25W : -60dBc/1MHz or less, and 20mW (+13dBm) / 1MHz or less.]

<This is based on ARIB input. Further input for co-located cellular systems is needed.>

6.9 Modulation Accuracy

The modulation accuracy is a measure of the difference between the measured waveform and the theoretical modulated waveform (the error vector). It is the square root of the ratio of the mean error vector power to the mean reference signal power expressed as %. The measurement interval is one timeslot.

~~Modulation accuracy is the difference between the measured and the theoretical modulated waveform. Modulation accuracy is measured as the root mean square value of the error of the vector of the ideal signal point.~~

6.9.1 Minimum Requirement

The Modulation accuracy shall not be worse than [12.5] %.

7 Receiver characteristics

7.1 General

Unless detailed the receiver characteristic are specified at each antenna connector of the BS.

<Definition of requirements for antenna diversity is ffs.>

7.2 Reference sensitivity level

The reference sensitivity is the minimum receiver input power measured at the antenna connector at which the FER/BER does not exceed the specific value indicated in section 7.3.1. The signal power is equally applied to each antenna connector for diversity.

7.2.1 BS reference sensitivity level

For the different services with corresponding data rates, the reference sensitivity level of the BS shall be specified in table 8 below.

Data rate	BS reference sensitivity level (dBm)	[FER/BER]

Table 8, BS reference sensitivity levels

7.2.2 Maximum Frequency Deviation for Receiver Performance

The need for such a requirement is for further study.

7.3 Dynamic range

The receiver dynamic range is the input power range at each BS antenna connector over which the [FER/BER] does not exceed a specific rate.

The static [BER/BER] reference performance as specified in clause 7.3.1 should be met over a receiver input range of [30] dB above the specified reference sensitivity level for [channel type ffs].

<The effect of applying mast head LNAs to the dynamic range specification is ffs.>

7.4 Adjacent eChannel sSelectivity (ACS)

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel, modulated signal in the adjacent channel. ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The static reference performance as specified in clause 7.3.1 should be met when the following signals are applied to the receiver;

- A wanted signal at the assigned channel frequency, 3 dB above the static reference level.
- A modulated interfering adjacent channel signal with a level of [] dBm.

7.5 Blocking characteristics

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels; without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

The static reference performance as specified in clause 7.3.1 should be met when the following signals are applied to the receiver;

- ❑ A wanted signal at the assigned channel frequency, 3 dB above the static reference level.
- ❑ An interfering signal at [frequency(s)] offset from the nominal assigned channel below a level of [] dBm.

< Editor The frequency range (in band/out of band) and level of the interfering signal is an item for further study >

<The definition of the exemptions needs to be reconsidered, since it is unclear.>

7.6 Spurious response

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the blocking limit is not met.

The static reference performance as specified in clause 7.3.1 should be met when the following signals are applied to the receiver;

- ❑ A wanted signal at the assigned channel frequency, 3 dB above the static reference level.
- ❑ A CW interfering signal below a level of [] dBm.
- ❑ The number of allowed spurious responses is an item for further study.

7.7 Intermodulation characteristics

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

The static reference performance as specified in clause 7.3.1 should be met when the following signals are applied to the receiver;

- ❑ A wanted signal at the assigned channel frequency, 3 dB above the static reference level.
- ❑ A CW interfering signal at frequency [10 MHz] and a [CW] signal at frequency [20.1 MHz] with a level of [] dBm.

7.8 Spurious emissions

<Text to be added.>

8 Performance requirement

8.1 General

Performance requirements are specified for a number of test environments and multi-path channel classes.

8.2 Dynamic reference sensitivity performance

The minimum required dynamic reference sensitivity performance is specified according to the traffic rate and the propagation conditions.

8.2.1 Performance in AWGN channel

The performance requirement in AWGN channel is determined by the E_b/I_0 required for BER=10⁻³, 10⁻⁶. The BER is calculated for each of the possible data services.

8.2.1.1 Single link performance

The required E_b/I_0 is described in Table XXX.

Table XXX E_b/I_0 required for BER=10⁻³, 10⁻⁶

Data services (BER)	Data rates (kbps)	Required E_b/I_0
Speech (10 ⁻³)	8	T.B.D.
Long Constrained Delay data bearer services (10 ⁻⁶)	64	T.B.D.
	2048	T.B.D.
Unconstrained Delay Data bearer services (10 ⁻⁶)	64	T.B.D.
	2048	T.B.D.

8.2.1.2 Multi link performance

The required E_b/I_0 is described in Table XXX.

Table XXX E_b/I_0 required for BER=10⁻³, 10⁻⁶

Data services (BER)	Number of active links	Data rates (kbps)	Required E_b/I_0
Speech (10 ⁻³)	N	8	T.B.D.

< The definition of the multi-link performance requirement is for further study >

8.2.2 Performance in multipath fading channels

The performance requirement of reverse link with/without TPC in multipath fading channels is determined by the E_b/I_0 required for BER=10⁻³, 10⁻⁶. The BER is calculated for each of the possible data services.

8.2.2.1 Single link performance

8.2.2.1.1 Performance without TPC

The required E_b/I_0 is described in Table XXX.

Table XXX E_b/I_0 required for BER=10⁻³, 10⁻⁶

Data services (BER)	Indoor (A), 3km/h		Pedestrian (A), 3km/h		Vehicular (A), 120km/h	
	Data rates	Required E_b/I_0	Data rates	Required E_b/I_0	Data rates	Required E_b/I_0
Speech (10 ⁻³)	8kbps	T.B.D.	8kbps	T.B.D.	8kbps	T.B.D.
Long Constrained Delay data bearer services (10 ⁻⁶)	64kbps	T.B.D.	64kbps	T.B.D.	64kbps	T.B.D.
	2048kbps	T.B.D.	384kbps	T.B.D.	144kbps	T.B.D.
					384kbps	T.B.D.
Unconstrained Delay Data bearer services (10 ⁻⁶)	64kbps	T.B.D.	64kbps	T.B.D.	64kbps	T.B.D.
	2048kbps	T.B.D.	384kbps	T.B.D.	144kbps	T.B.D.
					384kbps	T.B.D.

8.2.2.1.2 Performance with TPC

The required E_b/I_0 is described in Table XXX.

Table XXX E_b/I_0 required for BER=10⁻³, 10⁻⁶

Data services (BER)	Indoor (A), 3km/h		Pedestrian (A), 3km/h		Vehicular (A), 120km/h	
	Data rates	Required E_b/I_0	Data rates	Required E_b/I_0	Data rates	Required E_b/I_0
Speech (10 ⁻³)	8kbps	T.B.D.	8kbps	T.B.D.	8kbps	T.B.D.

Long Constrained Delay data bearer services (10^{-6})	64kbps	T.B.D.	64kbps	T.B.D.	64kbps	T.B.D.
	2048kbps	T.B.D.	384kbps	T.B.D.	144kbps	T.B.D.
					384kbps	T.B.D.
Unconstrained Delay Data bearer services (10^{-6})	64kbps	T.B.D.	64kbps	T.B.D.	64kbps	T.B.D.
	2048kbps	T.B.D.	384kbps	T.B.D.	144kbps	T.B.D.
					384kbps	T.B.D.

8.2.2.2 Multi link performance

The required E_b/I_0 is described in Table XXX.

Table XXX E_b/I_0 required for $BER=10^{-3}, 10^{-6}$

Data services (BER)	Number of active links	Data rates (kbps)	Required E_b/I_0
Speech (10^{-3})	N	8	T.B.D.

< The definition of the multi-link performance requirement is for further study >

Annex A (normative): Transmit power levels versus time

Annex B (normative): Propagation conditions

Annex C (normative): Environmental conditions

History

Document history		
V0.0.1	1999-02-19	Document created based on S4.01B v0.0.2 “UTRA (BS) FDD, radio transmission and reception”
V0.0.2	1999-02-25	Editorial update after WG4#2 for distribution on the e-mail reflector.
V1.0.0	1999-03-02	Version presented to TSG RAN for information (identical to version 0.0.2)
V1.0.1	1999-04-13	Update according to decisions in TSG RAN WG4#3 in Tokyo, Japan, sent to WG4 e-mail reflector for comments
<p>Editor</p> <p>Meik Kottkamp</p> <p>Siemens AG</p> <p>Tel: +49 89 722 36223</p> <p>Fax: +49 89 722 24450</p> <p>E-Mail: meik.kottkamp@icn.siemens.de</p> <p>This document is written in Microsoft Word 7.0</p>		