TSG-RAN Working Group 1 meeting No. 17
November 21-24, Stockholm, Sweden

***TSGR1-00-1416***

TSG-RAN Working Group 2 (Radio L2 and Radio L3)
Sophia Antipolis, France, 13 - 17 November 2000

R2-002467

**Source: TSG-RAN WG2**

**To: TSG-RAN WG1**

**Cc:**

**Title: LS on UE capabilities**

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During the last RAN WG2 meeting #17, Mitsubishi Electric presented a CR on 25.926 containing some editorial modifications in the definition of physical parameters. TSG-RAN WG2 likes to know the opinion of TSG-RAN WG1 on this document and asks TSG-RAN WG1 to provide updates if necessary for presentation to the RAN plenary in Bangkok.

Please find attached the TDOC R2-002317 ( CR 015r1 on 25.926 - Clarification on the TTI simultaneousness in the transport channel parameters ).

TSG RAN Working Group 2 meeting #17
Sophia Antipolis, France,
November 13th-17th 2000

**R2-002317**

**Agenda item:** 6.16

**Source:** Mitsubishi Electric (Trium R&D)

**Title:** CR 25.926, clarification on TTI simultaneousness in UE radio access capability

**Document for:** Discussion & Decision

# Introduction

In paper [2] the notion of time instant was introduced for the parameter "maximum sum of number of bits of all transport block…". However a transport block cannot be received at a time instant but needs some TTI to be received. In order to correct, we use the phrase "*in/from TTI's intersected by an arbitrary time instant*" instead of "*at an arbitrary time instant*". The exact meaning of this is given in the parameter definition.

Furthermore, the term "being received" assumes that what matters is the dynamic behaviour, not the semi-static configuration. So we replaced "being" by "that can be", with the same intention as that of [2] when the notion of arbitrary time instant was introduced to stress that dynamic behaviour is not considered.

Furthermore the notion of time instant was used for the number of bits parameter, but not for the number of blocks. We believe that the problem corrected by [2] also concern the number of blocks as there is a per block overhead.

Furthermore, the wording "convolutionally coded transport block" is not very good as it sounds as if the bits are counted at the output of the channel encoder and not at the L1/L2 interface.

Finally, it was clarified that "simultaneous transport channels" includes null bit rate transport channels.

# History

history R1-00-1278? R1-00-1300? R1-00-1314? R1-00-1315 ? R2-00-2195 (CR015) ? R2-00-2317 (CR015r1)

# Reference

[1] 25.926 v.3.2.0. 3rd Generation Partnership Project; Technical Specification Group Radio Access Network;UE Radio Access Capabilities; source RAN WG1.

[2] R1-00-1122 CR 25.926-xxx: Correction of Transport Channel Parameter, source Ericsson

[3] R1-00-1314 CR 25.926-xxxx, clarification on TTI simultaneousness in UE radio access capability, source Mitsubishi Electric

**3GPP TSG RAN WG2 Meeting #17**
**Sophia Antipolis, France, 13-17 November 2000**

***Document R2-002195***
*e.g. for 3GPP use the format TP-99xxx*
*or for SMG, use the format P-99-xxx*

# CHANGE REQUEST

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

| 25.926 | CR | 015r1 | Current Version: | 3.2.0 |
|---|---|---|---|---|

*GSM (AA.BB) or 3G (AA.BBB) specification number ?* *? CR number as allocated by MCC support team*

For submission to: RAN#10 *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:** *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

**Source:** Mitsubishi Electric Telecom Europe – TRIUM RD **Date:** 2000-10

**Subject:** Clarification on the TTI simultaneousness in the transport channel parameters

**Work item:** 6.16

**Category:** *(only one category Shall be marked With an X)*

| | | |
|---|---|---|
| F | Correction | [X] |
| A | Corresponds to a correction in an earlier release | [ ] |
| B | Addition of feature | [ ] |
| C | Functional modification of feature | [ ] |
| D | Editorial modification | [ ] |

**Release:**

| | |
|---|---|
| Phase 2 | [ ] |
| Release 96 | [ ] |
| Release 97 | [ ] |
| Release 98 | [ ] |
| Release 99 | [X] |
| Release 00 | [ ] |

**Reason for change:**

?? The term "number of bits of convolutionally coded transport blocks" was unclear, the reference point for this number of bits is the L1/L2 interface, but the wording could be interpreted as if it was the output of the channel coder. Same for turbo coding.

?? A transport block cannot be received "at an instant", it needs a TTI to be received. Same problem with "transmit" instead of "received"

?? The parameter on the "maximum number of transport blocks…" was still with the "ending within the same 10ms interval" and not with the arbitrary time instant wording. So we made the same correction as was made for the "maximum number of bit of all transport blocks…"

?? "being received" or "being transmitted" assumes that the dimensioning is based on the dynamic behaviour, and not on the semi-static configuration, such as the TFCS. So "being" was replaced by "that can be"

?? It was clarified that simultaneous transport channels include also transport channels that are currently at null bit rate

**Clauses affected:** 4.5, 4.5.1, 4.5.2, 5.1, 5.2.2, 5.2.3

**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:** Because of an MS-word problem barring and underlining does not always appear clearly in revision marks on the text in figure 4.3 (ex. 4.1). The figure needs to be open for the revision marks to appear correctly.

## 4.5 PHY parameters

In the following, the definitions below are applicable for the parameter naming:

"that can be received" (resp. "transmitted") means that, for all the simultaneous CCTrCHs, we consider all the TFCs within the respective TFCSs of the CCTrCHs over all simultaneous transport channels received (resp. transmitted) on the CCTrCHs by the UE.

"Arbitrary time instant" means that the relevant time instants are those corresponding to the highest value of the expression considered in the parameter name.

"TTIs intersected by an arbitrary time instant" has a different meaning in the downlink and in the uplink.

In the downlink "TTIs intersected by a time instant " means that we consider all the TTIs within which the considered time instant is included, where the beginning instant of each TTI is not included in it and the ending instant is included in it as illustrated on figure 4.1 below.

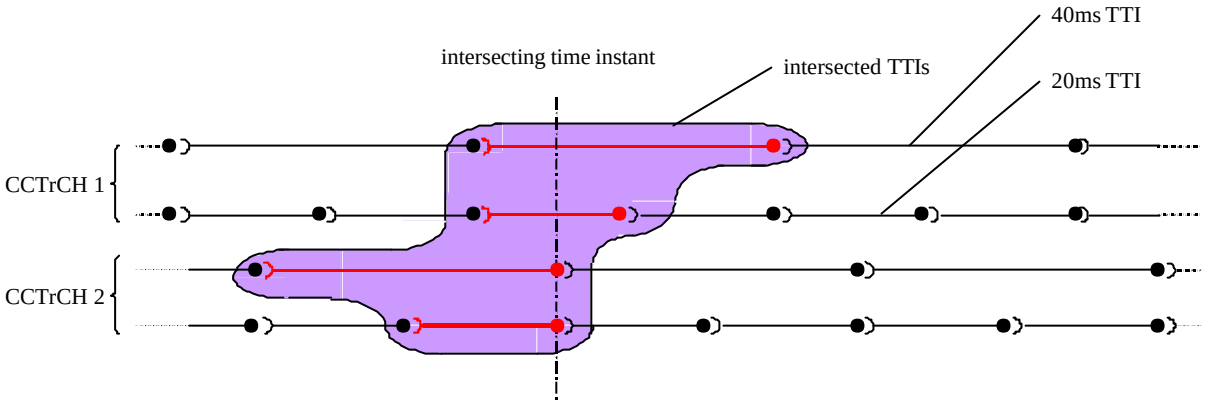


**Figure 4.1.** time instant intersecting TTIs for the UE in DL

In the uplink " TTIs intersected by a time instant " means that we consider all the TTIs within which the considered time instant is included, where the beginning instant of each TTI is included in it and the ending instant is not included as illustrated on figure 4.2 below.

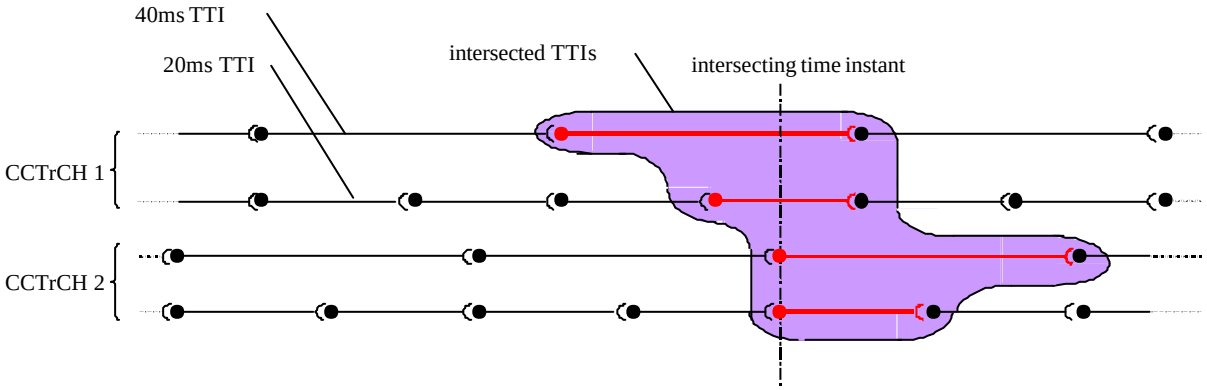


**Figure 4.2.** time instant intersecting TTIs for the UE in UL

NOTE : For explanatory purpose there are 2 CCTrCHs represented on figure 4.2. regardless of restrictions in release 99.

### 4.5.1 Transport channel parameters in downlink

Maximum sum of number of bits of all transport blocks that can be received from TTI's intersected by an arbitrary time instant ~~Maximum sum of number of bits of all transport blocks being received at an arbitrary time instant~~

~~NOTE: "Being received" refers to all bits in the active TFC within the TFCS over all simultaneous transport channels received by the UE. "Arbitrary time instant" means that the time instant corresponding to the highest sum of number of bits is relevant. This note also applies to similar parameter definitions below~~

This parameter is defined as an inclusive upper bound to the value of :

$$? \quad \text{~~?~~} \sum_i ?M_i ? A_i ?$$

where ~~$N_i$~~
$M_i$ is defined as the number of transport blocks for transport channel #i
$A_i$ is defined as transport block size of transport channel #i, i.e. the number of bits in transport blocks ~~#i,~~
$M_i$ and $A_i$ are taken for the active transport format in the TTI intersected by the considered arbitrary time instant and the sum is over all simultaneous transport ~~blocks~~ channels, e.g. DCH, FACH, PCH and/or DSCH, ~~being~~ where simultaneous means that they are received in TTIs intersected by ~~at~~ the considered ~~an~~ arbitrary time instant. ~~All transport blocks that are to be simultaneously received by the UE on DCH, FACH, PCH and DSCH transport channels are included in the parameter.~~

A UE does not need to support a TFC within the TFCS for which the sum of *Number of Transport Blocks* ?~~*~~ *Transport Block size* over all simultaneous transport channels is larger than what the UE capability indicates.

Maximum sum, over all convolutionally coded transport channels, of number of bits of all transport blocks that can be received from TTI's intersected by an arbitrary time instant ~~Maximum sum of number of bits of all convolutionally coded transport blocks being received at an arbitrary time instant.~~
This parameter is defined similar to the parameter above, but the sum ~~includes~~ is carried out only on the number of bits of transport blocks corresponding to convolutionally coded transport ~~blocks~~ channels .

Maximum sum, over all turbo coded transport channels, of number of bits of all transport blocks that can be received from TTIs intersected by an arbitrary time instant ~~Maximum sum of number of bits of all turbo coded transport blocks being received at an arbitrary time instant.~~

This parameter is defined similar to the parameter above, but the sum ~~includes~~ is carried out only on the number of bits of transport blocks corresponding to turbo coded transport ~~blocks~~ channels .

#### Maximum number of simultaneous transport channels

This is defined as the maximum number of Transport Channels that ~~should be possible to~~ can be processed simultaneously, not taking into account the ~~rate~~ active transport format of each Transport Channel, even if it corresponds to a null bit rate.

Simultaneous means that the transport channels are received from TTIs intersected by a same time instant (cf. Figure 4.1).

The number of simultaneous transport channels affects how the total memory space and processing capacity can be shared among the transport channels.

A UE does not need to support more simultaneous transport channels than the UE capability allows for.

#### Maximum number of simultaneous CCTrCH

CCTrCH should be interpreted as CCTrCH of any type, i.e. consisting of DCH, FACH or DSCH.

Maximum total number of transport blocks that can be received~~transmitted~~ from TTI's intersected by an arbitrary time instant~~Maximum total number of transport blocks received within TTIs that end within the same 10 ms interval~~

All transport blocks that are to be ~~simultaneously~~ received by the UE from TTI's intersected by the considered time instant on DCH, FACH, PCH and DSCH transport channels are included in the parameter.

Relates to processing requirements for CRC in downlink.

This parameter is defined as an inclusive upper bound to the value of :

$$? \quad \underline{\qquad\qquad\qquad\qquad} \; ? \; M_i$$
$$i$$

Where $M_i$ stands for the number of transport blocks for transport channel i for the active transport format in the considered respective TTIs.

A UE does not need to support a TFC within the TFCS for which the sum of *Number of Transport Blocks* is larger than what the UE capability indicates.

### Maximum number of TFC in the TFCS

The maximum number of TFC in a TFCS sets the size of the TFCI to TFCS mapping table to be handled by the UE.

### Maximum number of TF

The maximum total number of downlink transport formats the UE can store.

### Support for turbo decoding

Defines whether turbo decoding is supported or not.

The UTRAN configuration parameter is *Type of channel coding* which is part of the Transport format set (TFS) of each transport channel.

## 4.5.2 Transport channel parameters in uplink

Maximum sum of number of bits of all transport blocks that can be transmitted in TTIs intersected by an arbitrary time instant ~~Maximum sum of number of bits of all transport blocks being transmitted at an arbitrary time instant~~

NOTE: ~~"Being transmitted" refers to all bits in the active TFC within the TFCS over all simultaneous transport channels transmitted by the UE. "Arbitrary time instant" means that the time instant corresponding to the highest sum of number of bits is relevant. This note also applies to similar parameter definitions below.~~

This parameter is defined as an inclusive upper bound to the value of:

$$\underline{\qquad\qquad\qquad\qquad} \; ? \; ?M_i \; ? \; A_i \; ?$$
$$i$$

where
$M_i$ is defined as the number of transport blocks for transport channel #i
$A_i$ is defined as transport block size of transport channel #i, i.e. the number of bits in transport blocks
$M_i$ and $A_i$ are taken for the active transport format in the TTI intersected by the considered arbitrary time instant.~~? ?(N?)~~

~~where $N_i$ is defined as the number of bits in transport block #i, and the sum is over all transport blocks being transmitted at an arbitrary time instant.~~

This parameter is related to memory requirements for uplink data received from MAC before it can be transmitted over the radio interface. ~~As shown in Figure 4.1 the worst case occurs for the maximum TTI.~~

A UE does not need to support a TFC within the TFCS for which the sum of *Number of Transport Blocks* ?~~*~~ *Transport Block size* over all simultaneous transport channels is larger than what the UE capability indicates.

Maximum sum, over all convolutionally coded transport channels, of number of bits of all transport blocks that can be transmitted in TTIs intersected by an arbitrary time instant ~~Maximum sum of number of bits of all convolutionally coded transport blocks being transmitted at an arbitrary time instant~~

This parameter is defined similar to the parameter above, but the sum ~~includes~~ is carried out only on the number of bits of transport blocks corresponding to convolutionally coded transport ~~blocks~~channels.

Maximum sum, over all turbo coded transport channels, of number of bits of all transport blocks that can be transmitted in TTIs intersected by an arbitrary time instant ~~Maximum sum of number of bits of all turbo coded transport blocks being transmitted at an arbitrary time instant~~

This parameter is defined similar to the parameter above, but the sum ~~includes~~ is carried out only on the number of bits of transport blocks corresponding turbo coded transport ~~blocks~~channels.

Maximum number of simultaneous transport channels

Transport channels with an active transport format corresponding to a null bit rate shall be included in the number of simultaneous transport channels.

The number of simultaneous transport channels affects how the total memory space and processing capacity can be shared among the transport channels.

UTRAN shall not set up more simultaneous transport channels than the UE capability allows for.

Simultaneous means that the transport channels are transmitted in TTIs intersected by a same time instant (cf Figure 4.2).

Maximum number of simultaneous CCTrCH

TDD only. For FDD there is always only one CCTrCH at a time.

Maximum total number of transport blocks that can be transmitted in TTIs intersected by an arbitrary time instant ~~Maximum total number of transport blocks transmitted within TTIs that start at the same time~~

Relates to processing requirements for CRC in uplink.

This parameter is defined as an inclusive upper bound to the value of :

? $\sum_i M_i$

Where $M_i$ stands for the number of transport blocks for transport channel i for the active transport format in the considered respective TTIs.

A UE does not need to support the TFC within the TFCS for which the sum of *Number of Transport Blocks* is larger than what the UE capability allows for.

### Maximum number of TFC in the TFCS

The maximum number of TFC in a TFCS sets the size of the TFCI to TFCS mapping table to be handled by the UE.

### Maximum number of TF

The maximum total number of uplink transport formats the UE can store.

### Support for turbo encoding

Defines whether turbo encoding is supported or not.

The UTRAN configuration parameter is *Type of channel coding* which is part of the Transport format set (TFS) of each transport channel.

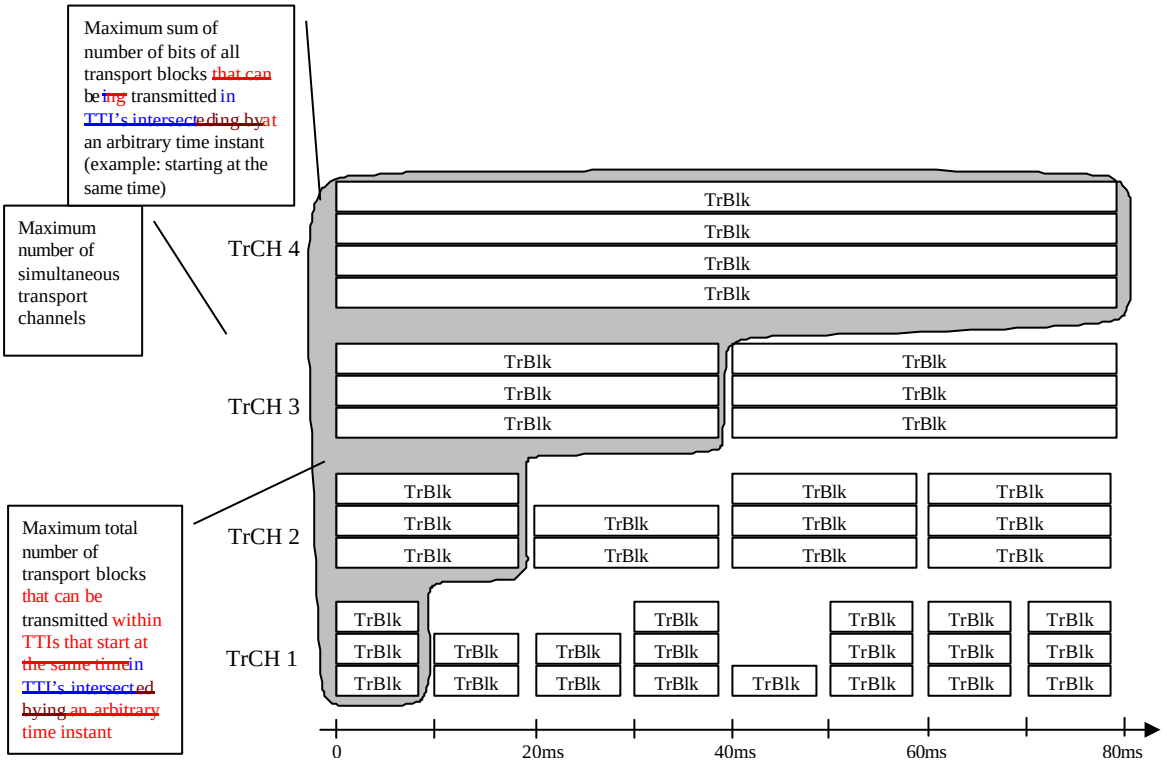


**Figure 4.~~1~~3: UE transport channel processing limitations in uplink**

NOTE: When CPCH is supported, then simultaneous DPCCH & SCCPCH reception is needed.

# 5 Possible UE radio access capability parameter settings

## 5.1 Value ranges

**Table 5.1: UE radio access capability parameter value ranges**

| | | UE radio access capability parameter | Value range |
|---|---|---|---|
| PDCP parameters | | Header compression algorithm supported | Yes/No |
| RLC parameters | | Total RLC AM buffer size | 2,10,50,100,150,500,1000 kBytes |
| | | Maximum number of AM entities | 3,4,5,6,8,16,32 |
| PHY parameters | Transport channel parameters in downlink | Maximum sum of number of bits of all transport blocks that can be ~~being~~ received ~~at~~ from TTIs intersected by an arbitrary time instant (see Note 1) | 640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840 |
| | | Maximum sum , over all convolutionally coded transport channels, of number of bits of all ~~convolutionally coded~~ transport blocks that can be~~ing~~ received ~~at~~ from TTIs intersected by an arbitrary time instant (see Note 1) | 640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840 |
| | | Maximum sum , over all turbo coded transport channels, of number of bits of all ~~turbo coded~~ transport blocks that can be~~being~~ received ~~at~~ from TTIs intersected by an arbitrary time instant (see Note 1) | 640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840 |
| | | Maximum number of simultaneous transport channels | 4, 8, 16, 32 |
| | | Maximum number of simultaneous CCTrCH | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Maximum total number of transport blocks that can be received from TTIs intersected by an arbitrary time instant (see Note 1)~~within TTIs that end within the same 10 ms interval~~ | 4, 8, 16, 32, 48, 64, 96, 128, 256, 512 |
| | | Maximum number of TFC in the TFCS | 16, 32, 48, 64, 96, 128, 256, 512, 1024 |
| | | Maximum number of TF | 32, 64, 128, 256, 512, 1024 |
| | | Support for turbo decoding | Yes/No |
| | Transport channel parameters in uplink | Maximum sum of number of bits of all transport blocks that can be ~~being~~ transmitted in TTIs intersected by~~at~~ an arbitrary time instant (see Note 1) | 640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840 |
| | | Maximum sum , over all convolutionally coded transport channels, of number of bits of all ~~convolutionally coded~~ transport blocks ~~being~~ that can be transmitted ~~at~~ in TTIs intersected by an arbitrary time instant (see Note 1) | 640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840 |
| | | Maximum sum , over all turbo coded transport channels, of number of bits of all ~~turbo coded~~ transport blocks ~~being~~ that can be transmitted ~~at~~ in TTIs intersected by an arbitrary time instant (see Note 1) | 640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960, 81920, 163840 |
| | | Maximum number of simultaneous transport channels | 2, 4, 8, 16, 32 |

| | | UE radio access capability parameter | Value range |
|---|---|---|---|
| | | Maximum number of simultaneous CCTrCH of DCH type (TDD only) | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Maximum total number of transport blocks that can be transmitted in TTIs intersected by an arbitrary time instant (see Note 1)~~within TTIs that start at the same time~~ | 2, 4, 8, 16, 32, 48, 64, 96, 128, 256, 512 |
| | | Maximum number of TFC in the TFCS | 4, 8, 16, 32, 48, 64, 96, 128, 256, 512, 1024 |
| | | Maximum number of TF | 32, 64, 128, 256, 512, 1024 |
| | | Support for turbo encoding | Yes/No |
| | FDD Physical channel parameters in downlink | Maximum number of DPCH/PDSCH codes to be simultaneously received | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Maximum number of physical channel bits received in any 10 ms interval (DPCH, PDSCH, S-CCPCH) | 600, 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 48000, 57600, 67200, 76800 |
| | | Support for SF 512 | Yes/No |
| | | Support of PDSCH | Yes/No |
| | | Simultaneous reception of SCCPCH and DPCH | Yes/No |
| | | Simultaneous reception of SCCPCH, DPCH and PDSCH | Yes/No |
| | | Maximum number of simultaneous S-CCPCH radio links | 1<br>NOTE: Only the value 1 is part of R99 |
| | FDD Physical channel parameters in uplink | Maximum number of DPDCH bits transmitted per 10 ms | 600, 1200, 2400, 4800, 960, 19200, 28800, 38400, 48000, 57600 |
| | | Support of PCPCH | Yes/No |
| | TDD physical channel parameters in downlink | Maximum number of timeslots per frame | 1..14 |
| | | Maximum number of physical channels per frame | 1,2,3..,224 |
| | | Minimum SF | 16, 1 |
| | | Support of PDSCH | Yes/No |
| | | Maximum number of physical channels per timeslot | 1..16 |
| | TDD physical channel parameters in uplink | Maximum Number of timeslots per frame | 1..14 |
| | | Maximum number of physical channels per timeslot | 1, 2 |
| | | Minimum SF | 16,8,4,2,1 |
| | | Support of PUSCH | Yes/No |
| RF parameters | FDD RF parameters | UE power class<br>(25.101 subclause 6.2.1) | 3, 4<br>NOTE: Only power classes 3 and 4 are part of R99 |
| | | Tx/Rx frequency separation<br><br>(25.101 subclause 5.3) .<br>NOTE: Not applicable if UE is not operating in frequency band a | 190 MHz<br>174.8-205.2 MHz<br>134.8-245.2 MHz |
| RF parameters | TDD RF parameters | UE power class<br>(25.102) | 2,3<br>NOTE: Only power classes 2 and 3 are part of R99 |
| | | Radio frequency bands<br>(25.102) | a), b), c), a+b), a+c), a+b+c) |
| | | Chip rate capability<br>(25.102) | 3.84,1.28 |
| Multi-mode related parameters | | Support of UTRA FDD/TDD | FDD, TDD, FDD+TDD |
| Multi-RAT related parameters | | Support of GSM | Yes/No |
| | | Support of multi-carrier | Yes/No |

| | UE radio access capability parameter | Value range |
|---|---|---|
| LCS related parameters | Standalone location method(s) supported | Yes/No |
| | Network assisted GPS support | Network based / UE based / Both/ None |
| | GPS reference time capable | Yes/No |
| | Support for IPDL | Yes/No |
| | Support for OTDOA UE based method | Yes/No |
| Measurement related capabilities | Need for downlink compressed mode | Yes/No (per frequency band, UTRA mode and RAT) |
| | Need for uplink compressed mode | Yes/No (per frequency band, UTRA mode and RAT) |

NOTE 1: The exact meaning of the phrase "TTI's intersected by an arbitrary time instant" has a different meaning for downlink and for uplink and is given in section 4.5

## 5.2 Reference UE radio access capability combinations

Based on required UE radio access capabilities to support reference RABs as defined in clause 6, this clause lists reference UE Radio Access capability combinations. Subclause 5.2.1 defines reference combinations of UE radio access capability parameters common for UL and DL. Subclause 5.2.2 and 5.2.3 define reference combinations of UE radio access capability parameters that are separate for DL and UL respectively. A reference combination for common UL and DL parameters, one combination for UL parameters and one combination for DL parameters together relate to a UE with a certain implementation complexity, that allows support for one or several combined reference RABs. Combinations for UL and DL can be chosen independently. The bit rate supported by the selected combination of common UL and DL parameters needs to be at least as high as the maximum out of the supported bit rates of the selected combination of DL parameters and the selected combination of UL parameters. Different combinations have different levels of implementation complexity.

For defined reference RABs, it is possible to require a UE to meet a certain reference UE radio access capability combination. Each UE needs to have capabilities complying with a given reference radio access capability combination. Each individual radio access capability parameter as defined in Subclause 5.1 shall be signalled.

The reference combination numbers shall not be used in the signalling of UE radio access capabilities between the UE and UTRAN. Reference UE radio access capability combinations provide default configurations that should be used as a basis for conformance testing against reference RABs.

Allowed values of UE capability parameters are limited by the defined range and granularity of values in Subclause 5.1. Values might change depending on further definition of reference RABs for testing.

## 5.2.1 Combinations of common UE Radio Access Parameters for UL and DL

NOTE: It is FFS whether measurement-related capabilities need to be included in the combinations. These capabilities are independent from the supported RABs.

**Table 5.2.1.1: UE radio access capability parameter combinations, parameters common for UL and DL**

| Reference combination of UE Radio Access capability parameters common for UL and DL | 32kbps class | 64kbps class | 128kbps class | 384kbps class | 768kbps class | 2048kbps class |
|---|---|---|---|---|---|---|
| **PDCP parameters** | | | | | | |
| Header compression algorithm supported | No | No/Yes NOTE 1 | No/Yes NOTE 1 | No/Yes NOTE 1 | No/Yes NOTE 1 | No/Yes NOTE 1 |
| **RLC parameters** | | | | | | |
| Total RLC AM buffer size (kbytes) | 10 | 10 | 50 | 50 | 100 | 500 |
| Maximum number of AM entities | 4 | 4 | 5 | 6 | 8 | 8 |
| **Multi-mode related parameters** | | | | | | |
| Support of UTRA FDD/TDD | FDD / FDD+TDD / TDD NOTE 1 | | | | | |
| **Multi-RAT related parameters** | | | | | | |
| Support of GSM | Yes/No NOTE 1 | | | | | |
| Support of multi-carrier | Yes/No NOTE 1 | | | | | |
| **LCS related parameters** | | | | | | |
| Standalone location method(s) supported | Yes/No NOTE 1 | | | | | |
| Network assisted GPS support | Network based / UE based / Both/ None NOTE 1 | | | | | |
| GPS reference time capable | Yes/No NOTE 1 | | | | | |
| Support for IPDL | Yes/No NOTE 1 | | | | | |
| Support for OTDOA UE based method | Yes/No NOTE 1 | | | | | |
| **RF parameters for FDD** | | | | | | |
| UE power class | 3 / 4 NOTE 1 | | | | | |
| Tx/Rx frequency separation | 190 MHz | | | | | |
| **RF parameters for TDD** | | | | | | |
| Radio frequency bands | A / b / c / a+b / a+c / b+c / a+b+c NOTE 1 | | | | | |
| Chip rate capability | 1.28 / 3.84 Mchip/sec NOTE 1 | | | | | |
| UE power class | 2 / 3 NOTE 1 | | | | | |

NOTE 1: Options represent different combinations that should be supported with Conformance Tests.

## 5.2.2 Combinations of UE Radio Access Parameters for DL

**Table 5.2.2.1: UE radio access capability parameter combinations, DL parameters**

| Reference combination of UE Radio Access capability parameters in DL | 32kbps class | 64kbps class | 128kbps class | 384kbps class | 768kbps class | 2048kbps class |
|---|---|---|---|---|---|---|
| **Transport channel parameters** | | | | | | |
| Maximum sum of number of bits of all transport blocks ~~being~~ that can be received from TTIs intersected by~~at~~ an arbitrary time instant (NOTE 3) | 640 | 3840 | 3840 | 6400 | 10240 | 20480 |
| Maximum sum , over all convolutionally coded transport channels, of number of bits of all ~~convolutionally coded~~ transport blocks that can be~~ing~~ received from TTIs intersected by~~at~~ an arbitrary time instant (NOTE 3) | 640 | 640 | 640 | 640 | 640 | 640 |
| Maximum sum , over all turbo coded transport channels, of number of bits of all ~~turbo coded~~ transport blocks ~~being~~ that can be received from TTIs intersected by~~at~~ an arbitrary time instant (NOTE 3) | NA | 3840 | 3840 | 6400 | 10240 | 20480 |
| Maximum number of simultaneous transport channels | 8 | 8 | 8 | 8 | 8 | 16 |
| Maximum number of simultaneous CCTrCH (FDD) | 1 | 2/1 NOTE 2 | 2/1 NOTE 2 | 2/1 NOTE 2 | 2 | 2 |
| Maximum number of simultaneous CCTrCH (TDD) | 2 | 3 | 3 | 3 | 4 | 4 |
| Maximum total number of transport blocks that can be received ~~within TTIs that end at the same time~~ from TTIs intersected by an arbitrary time instant (NOTE 3) | 8 | 8 | 16 | 32 | 64 | 96 |
| Maximum number of TFC in the TFCS | 32 | 48 | 96 | 128 | 256 | 1024 |
| Maximum number of TF | 32 | 64 | 64 | 64 | 128 | 256 |
| Support for turbo decoding | No | Yes | Yes | Yes | Yes | Yes |
| **Physical channel parameters (FDD)** | | | | | | |
| Maximum number of DPCH/PDSCH codes to be simultaneously received | 1 | 2/1 NOTE 2 | 2/1 NOTE 2 | 3 | 3 | 3 |
| Maximum number of physical channel bits received in any 10 ms interval (DPCH, PDSCH, S-CCPCH). | 1200 | 3600/2400 NOTE2 | 7200/4800 NOTE2 | 19200 | 28800 | 57600 |
| Support for SF 512 | No | No | No | No | No | No |
| Support of PDSCH | No | Yes/No NOTE 1 | Yes/No NOTE 1 | No/Yes NOTE 1 | Yes | Yes |
| Maximum number of simultaneous S-CCPCH radio links | 1 | 1 | 1 | 1 | 1 | 1 |
| **Physical channel parameters (TDD)** | | | | | | |
| Maximum number of timeslots per frame | 1 | 2 | 4 | 5 | 10 | 12 |
| Maximum number of physical channels per frame | 8 | 9 | 14 | 28 | 64 | 136 |
| Minimum SF | 16 | 16 | 16 | 1/16 NOTE 1 | 1/16 NOTE 1 | 1/16 NOTE 1 |
| Support of PDSCH | Yes/No NOTE 1 | Yes | Yes | Yes | Yes | Yes |
| Maximum number of physical channels per timeslot | 8 | 9 | 9 | 9 | 9 | 13 |

NOTE 1: Options represent different combinations that should be supported with conformance tests.

NOTE 2: Options depend on the support of PDSCH. The highest value is required if PDSCH is supported.

NOTE 3: The exact meaning of the phrase "in TTIs intersected by an arbitrary time instant" has a different meaning for downlink and for uplink and is given in section 4.5

## 5.2.3 Combinations of UE Radio Access Parameters for UL

**Table 5.2.3.1: UE radio access capability parameter combinations, UL parameters**

| Reference combination of UE Radio Access capability parameters in UL | 32kbps class | 64kbps class | 128kbps class | 384kbps class | 768kbps class |
|---|---|---|---|---|---|
| **Transport channel parameters** | | | | | |
| Maximum sum of number of bits of all transport blocks ~~being~~ that can be transmitted in TTIs intersected by~~at~~ an arbitrary time instant (NOTE 3) | 640 | 3840 | 3840 | 6400 | 10240 |
| Maximum sum , over all convolutionally coded transport channels, of number of bits of all ~~convolutionally coded~~ transport blocks that can be~~being~~ transmitted in TTI's intersected by ~~at~~ an arbitrary time instant (NOTE 3) | 640 | 640 | 640 | 640 | 640 |
| Maximum sum , over all turbo coded transport channels, of number of bits of all ~~turbo coded~~ transport blocks that can be~~being~~ transmitted in TTI's intersected by ~~at~~ an arbitrary time instant (NOTE 3) | NA | 3840 | 3840 | 6400 | 10240 |
| Maximum number of simultaneous transport channels | 4 | 8 | 8 | 8 | 8 |
| Maximum number of simultaneous CCTrCH(TDD only) | 1 | 2 | 2 | 2 | 2 |
| Maximum total number of transport blocks that can be transmitted in TTI's intersected by an arbitrary time instant (NOTE 3)~~within TTIs that start at the same time~~ | 4 | 8 | 8 | 16 | 32 |
| Maximum number of TFC in the TFCS | 16 | 32 | 48 | 64 | 128 |
| Maximum number of TF | 32 | 32 | 32 | 32 | 64 |
| Support for turbo encoding | No | Yes | Yes | Yes | Yes |
| **Physical channel parameters (FDD)** | | | | | |
| Maximum number of DPDCH bits transmitted per 10 ms | 1200 | 2400 | 4800 | 9600 | 19200 |
| Simultaneous reception of SCCPCH and DPCH NOTE 2 | No | No | Yes/No NOTE 1 | Yes/No NOTE 1 | Yes/No NOTE 1 |
| Simultaneous reception of SCCPCH, DPCH and PDSCH NOTE 2 | No | No | No | No | No |
| Support of PCPCH | No | No | No | No | No |
| **Physical channel parameters (TDD)** | | | | | |
| Maximum Number of timeslots per frame | 1 | 2 | 3 | 7 | 9 |
| Maximum number of physical channels per timeslot | 1 | 1 | 1 | 1 | 2 |
| Minimum SF | 8 | 2 | 2 | 2 | 2 |
| Support of PUSCH | Yes/No NOTE 1 | Yes | Yes | Yes | Yes |

NOTE 1: Options represent different combinations that should be supported with conformance tests.

NOTE 2: The downlink parameters 'Simultaneous reception of SCCPCH and DPCH' and 'Simultaneous reception of SCCPCH, DPCH and PDSCH' are included in the combinations for uplink as their requirements relate to the uplink data rate. Simultaneous reception of SCCPCH and DPCH is required for the DRAC procedure that is intended for controlling uplink transmissions. In release 99, this is limited to 1 SCCPCH.

NOTE 3: The exact meaning of the phrase " in TTI's intersected by an arbitrary time instant" has a different meaning for downlink and for uplink and is given in section 4.5