Agenda item: AH99

Source: Mitsubishi Electric (Trium R&D)

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

Document for: Decision&Discussion

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.

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 be rate transport channels.

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

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	**XXXX**		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		*(for SMG*
non-strategic		*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 (Trium R&D)	**Date:**	2000-10

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

Work item:	

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:	4.5.1; 4.5.2; 5.1

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:	

4.5.1 Transport channel parameters in downlink

For any arbitrary time instant t, maximum sum of number of bits of all transport blocks that can be received in TTIs intersecting time instant t~~Maximum sum of number of bits of all transport blocks being received at an arbitrary time instant~~

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

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

$$? \qquad \qquad ?_{i\,(N_t)} ? \; ?M_i ? A_i ?$$
$$ i$$

where ~~N~~.
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 block~~s~~ ~~#i,~~
M_i and A_i are taken for the active transport format in the TTI intersecting 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 intersecting ~~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.

In the context of the parameters defined in this section "intersecting time instant t" means that time instant t is within the considered TTI where the beginning instant is not included in the TTI and the ending instant is included.
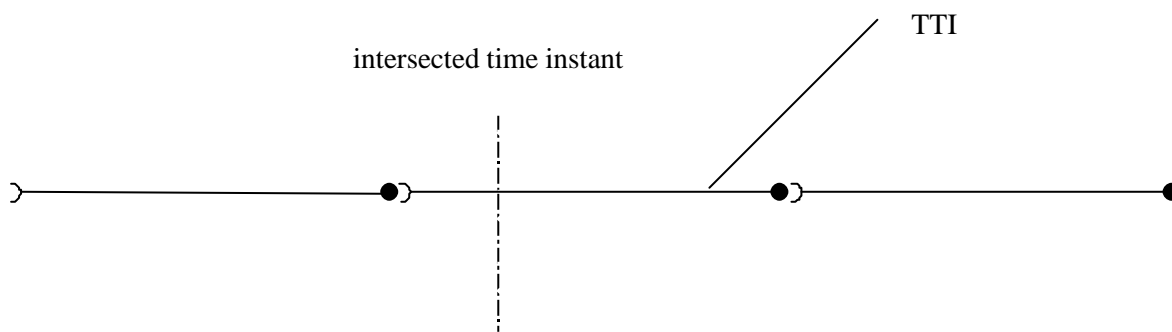
Figure 4.1. time instant intersected by a TTI for the UE in DL.

For any arbitrary time instant t, maximum sum, over all convolutionally coded transport channels i, of number of bits of all transport blocks of transport channel i that can be received in TTIs intersecting time instant t~~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 over convolutionally coded transport ~~blocks~~channels .

For any arbitrary time instant t, maximumsum, over all turbo coded transport channels i, of number of bits of all transport blocks of transport channel i that can be received in TTIs intersecting time instant t~~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 over 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 process_ed_ 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 in TTIs intersecting a same time instant.

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.

For any time instant t.maximum total number of transport blocks that can be received in TTIs intersecting time instant t~~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 in TTIs intersecting a same time instant t by the UE on DCH, FACH, PCH and DSCH transport channels are included in the parameter.

Relates to processing requirements for CRC in downlink.

Note : "Arbitrary time instant" means that the time instants when the maximum is reached are relevant.

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 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

For any arbitrary time instant t, maximum sum of number of bits of all transport blocks that can be transmitted in TTIs intersecting (see Note 2) time instant t~~Maximum sum of number of bits of all transport blocks being transmitted at an arbitrary time instant~~

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

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

$$\sum_i \{M_i \cdot A_i\}$$

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 intersecting the considered arbitrary time instant.~~$\sum_i (N_i)$~~

~~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.

In the context of the parameters defined in this section "intersecting time instant t" means that time instant t is within the considered TTI where the beginning instant is included in the TTI and the ending instant is not included.
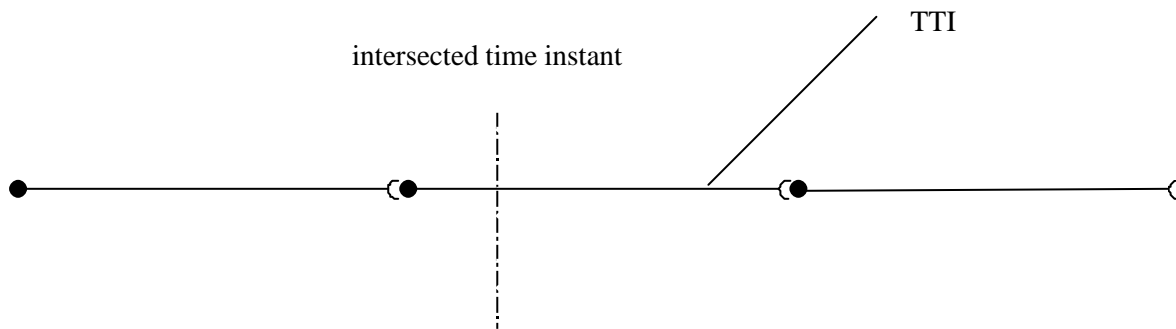
Figure 4.2. time instant intersected by a TTI for the UE in UL

For any arbitrary time instant t, maximum sum, over all convolutionally coded transport channels i, of number of bits of all transport blocks of transport channel i that can be transmitted in TTIs intersecting (see Note 2) time instant t~~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 over convolutionally coded transport ~~blocks~~channels .

For any arbitrary time instant t, maximum sum, over all turbo coded transport channels i, of number of bits of all transport blocks of transport channel i that can be transmitted in TTIs intersecting time instant t~~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 over 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 intersecting a same time instant.

Maximum number of simultaneous CCTrCH

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

For any arbitrary time instant t, maximum total number of transport blocks transmitted in TTIs that can be transmitted in TTIs intersecting time instant t~~Maximum total number of transport blocks transmitted within TTIs that start at the same time~~

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

$$? \qquad\qquad\qquad\qquad ? \sum_i M_i$$

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

Relates to processing requirements for CRC in uplink.

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

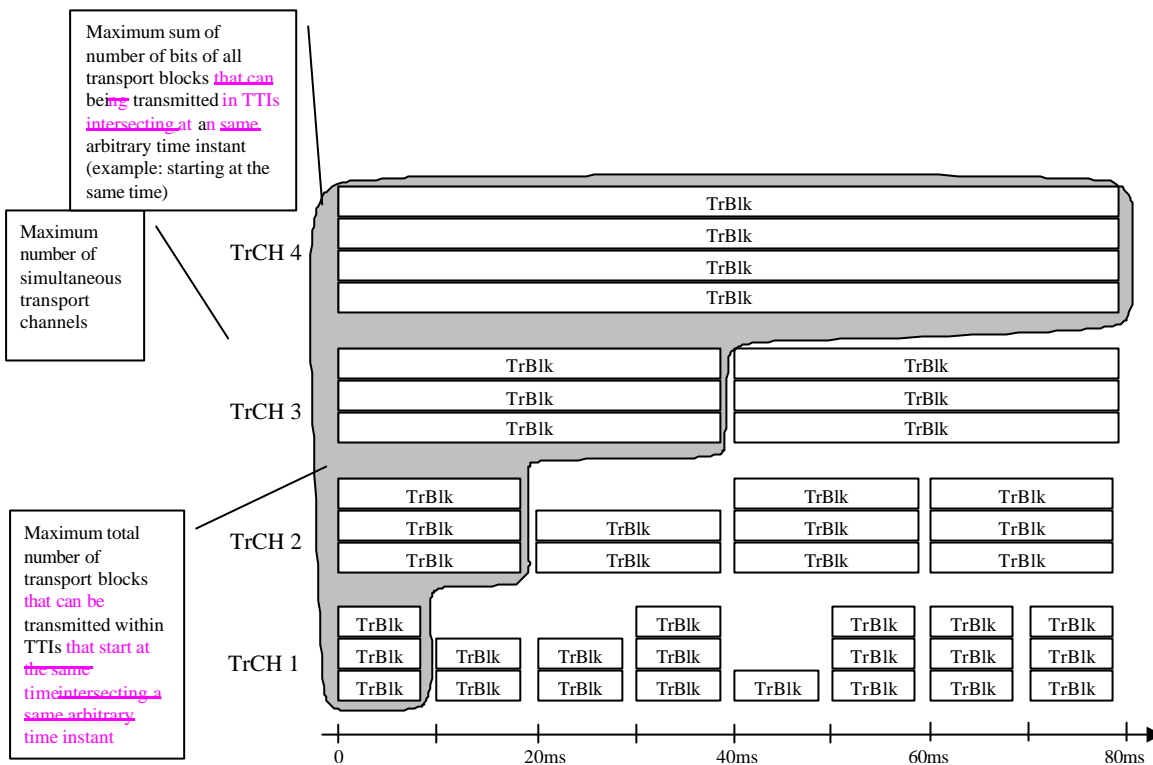The maximum number of TFC in a TFCS sets the size of the TFCI to TFCS mapping table to be handled by the UE.

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.

Maximum sum of number of bits of all transport blocks ~~that can~~ bei~~ng~~ transmitted in TTIs ~~intersecting at~~ an ~~same,~~ arbitrary time instant (example: starting at the same time)

Maximum number of simultaneous transport channels

TrCH 4

TrBlk
TrBlk
TrBlk
TrBlk

TrCH 3

TrBlk
TrBlk
TrBlk

TrBlk
TrBlk
TrBlk

Maximum total number of transport blocks that can be transmitted within TTIs ~~that start at the same time~~intersecting a same arbitrary time instant

TrCH 2

TrBlk
TrBlk
TrBlk

TrBlk
TrBlk

TrBlk
TrBlk
TrBlk

TrBlk
TrBlk
TrBlk

TrCH 1

TrBlk
TrBlk
TrBlk

TrBlk
TrBlk

TrBlk
TrBlk

TrBlk
TrBlk
TrBlk

TrBlk

TrBlk
TrBlk
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TrBlk
TrBlk
TrBlk

TrBlk
TrBlk
TrBlk

0   20ms   40ms   60ms   80ms

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

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

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	For any arbitrary time instant t, ~~M~~maximum sum of number of bits of all transport blocks that can be received in TTIs intersecting (see Note 1) time instant t~~being received at an arbitrary time instant~~	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960 81920, 163840
		For any arbitrary time instant t, ~~m~~Maximum sum , over all convolutionally coded transport channels i, of number of bits of all ~~convolutionally coded~~ transport blocks of transport channel i that can be received in TTIs intersecting (see Note 1) time instant t~~being received at an arbitrary time instant~~	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960 81920, 163840
		For any arbitrary time instant t, ~~M~~maximum sum , over all turbo coded transport channels i, of number of bits of all ~~turbo coded~~ transport blocks of transport channel i that can be received in TTIs intersecting (see Note 1) time instant~~being received at an arbitrary time instant~~	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
		For any time instant t. ~~M~~maximum total number of transport blocks that can be received in TTIs intersecting (see Note 1) time instant t~~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	For any arbitrary time instant t, ~~m~~Maximum sum of number of bits of all transport blocks that can be transmitted in TTIs intersecting (see Note 2) time instant t~~being transmitted at an arbitrary time instant~~	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960 81920, 163840
		For any arbitrary time instant t, ~~m~~Maximum sum , over all convolutionally coded transport channels i, of number of bits of all ~~convolutionally coded~~ transport blocks of transport channel i that can be transmitted in TTIs intersecting (see Note 2) time instant t~~being transmitted at an arbitrary time instant~~	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960 81920, 163840

		UE radio access capability parameter	Value range
		For any arbitrary time instant t, ~~m~~Maximum sum , over all turbo coded transport channels i, of number of bits of all ~~turbo coded~~ transport blocks of transport channel i that can be transmitted in TTIs intersecting (see Note 2) time instant t~~being transmitted at an arbitrary time instant~~	640, 1280, 2560, 3840, 5120, 6400, 7680, 8960, 10240, 20480, 40960 81920, 163840
		Maximum number of simultaneous transport channels	2, 4, 8, 16, 32
		Maximum number of simultaneous CCTrCH of DCH type (TDD only)	1, 2, 3, 4, 5, 6, 7, 8
		For any arbitrary time instant t, ~~m~~Maximum total number of transport blocks transmitted ~~with~~in TTIs that can be transmitted in TTIs intersecting (see Note 2) time instant t~~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 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 (25.101 subclause 6.2.1)	3, 4 NOTE: Only power classes 3 and 4 are part of R99
		Tx/Rx frequency separation (25.101 subclause 5.3) . NOTE: Not applicable if UE is not operating in frequency band a	190 MHz 174.8-205.2 MHz 134.8-245.2 MHz

		UE radio access capability parameter	**Value range**
RF parameters	TDD RF parameters	UE power class (25.102)	2,3 NOTE: Only power classes 2 and 3 are part of R99
		Radio frequency bands (25.102)	a), b), c), a+b), a+c), a+b+c)
		Chip rate capability (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
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: In the context of this parameter definition, a TTI is assumed to include its ending time instant and to exclude its beginning time instant.

NOTE 2: In the context of this parameter definition, a TTI is assumed to exclude its ending time instant and to include its beginning time instant.