TSG-RAN Meeting #13
Beijing, China, 18 - 21, September, 2001

RP-010528

Title: **Agreed CR (Rel-4) to TS 25.221**

Source: **TSG-RAN WG1**

Agenda item: **8.1.4**

No.	Spec	CR	Rev	R1 T-doc	Subject	Release	Cat	W/I Code	V_old	V_new
1	25.221	058	1	R1-01-0967	Corrections for TS 25.221	REL-4	F	LCRTDD-Phys	4.1.0	4.2.0

3GPP TSG RAN Meeting #13 ***R1-01-0967***
Beijing, China, 18th – 21st , September, 2001

CR-Form-v3

CHANGE REQUEST

⌘ **25.221** **CR** **058** ⌘ rev **1** ⌘ Current version: **4.1.0** ⌘

*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 **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Corrections for TS 25.221
Source:	⌘	TSG RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	30.08.2001
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential 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:	⌘	Some inconsistencies between WG1 and WG2 are removed
Summary of change:	⌘	Some small corrections In revision 1 of this CR the following modifications have been made: • Removal of Description of power control for PUSCH, PDSCH in section 6.3.6 and 6.3.7 since also described in TS 25.224 (which is the right place) – was therefore redundant • a Typo in the proposed 1st version of the CR has been corrected in section 6.3.3 (*codes* replaced by *code*) .
Consequences if not approved:	⌘	Remaining inconsistencies between WG1 and WG2 specs

Clauses affected:	⌘	6.2.2.1, 6.2.2.2, 6.2.2.3, 6.3.3, 6.3.6, 6.3.7, 8.2.4
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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/3G_Specs/CRs.htm.
Below is a brief summary:

6.2.2.1 Transmission of TFCI

The traffic burst format provides the possibility for transmission of TFCI in uplink and downlink.

The transmission of TFCI is ~~negotiated at call setup and can be re-negotiated during the call~~configured by higher Layers. For each CCTrCH it is indicated by higher layer signalling, which TFCI format is applied. Additionally for each allocated timeslot it is signalled individually whether that timeslot carries the TFCI or not. If a time slot contains the TFCI, then it is always transmitted using the first allocated channelisation code in the timeslot, according to the order in the higher layer allocation message.

The transmission of TFCI is done in the data parts of the respective physical channel, this means TFCI and data bits are subject to the same spreading procedure as depicted in [8]. Hence the midamble structure and length is not changed.

The encoded TFCI symbols are equally distributed between the two subframes and the respective data fields. The TFCI information is to be transmitted possibly either directly adjacent to the midamble or after the SS and TPC symbols. Figure 23 shows the position of the TFCI in a traffic burst, if neither SS nor TPC are transmitted. Figure 24 shows the position of the TFCI in a traffic burst , if SS and TPC are transmitted.

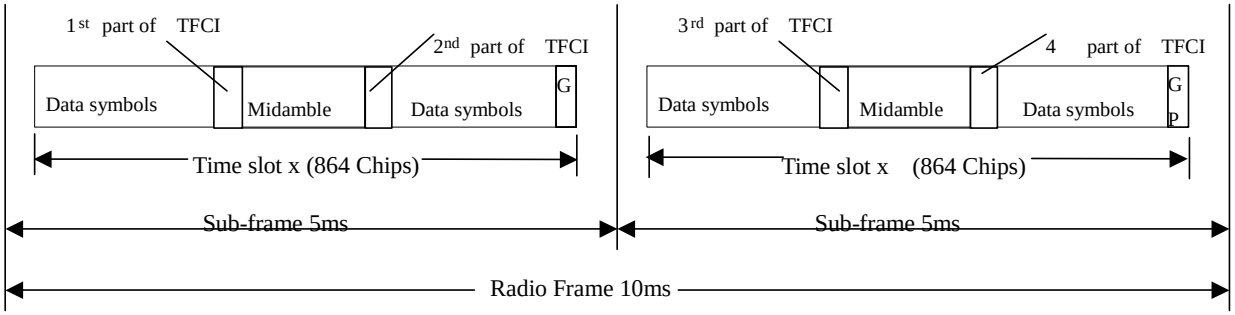

Figure 23: Position of TFCI information in the traffic burst in case of no TPC and SS in 1.28 Mcps TDD

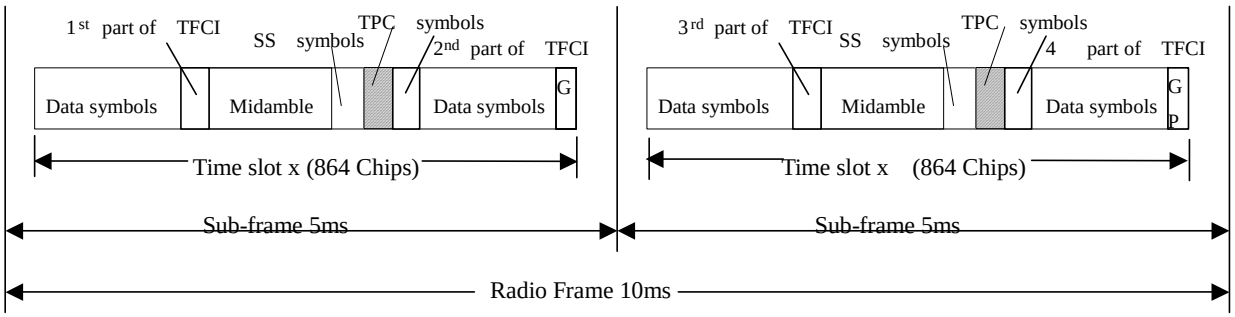

Figure 24:Position of TFCI information in the traffic burst in case of TPC and SS in 1.28 Mcps TDD

6.2.2.2 Transmission of TPC

The burst type for dedicated channels provides the possibility for transmission of TPC in uplink and downlink.

The transmission of TPC is done in the data parts of the traffic burst. Hence the midamble structure and length is not changed. The TPC information is to be transmitted directly after the SS information, which is transmitted after the midamble. Figure 25 shows the position of the TPC command in a traffic burst.

For every user the TPC information is to be transmitted at least once per 5ms sub-frame. If applied, transmission of TPC is done in the data parts of the traffic burst and it can be transmitted using the first allocated channelisation code and the first allocated timeslot (according to the order in the higher layer allocation message). Other allocations (more than one TPC transmission in one sub-frame) of TPC are also possible. The TPC is spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.

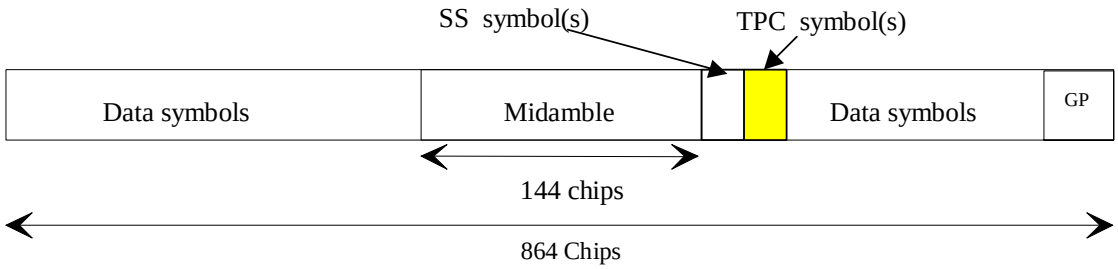

Figure 25: Position of TPC information in the traffic burst in downlink and uplink

For the number of layer 1 symbols per channelisation code there are 3 possibilities for each channelisation code, configured by higher layers:

1) one SS and one TPC symbol
2) no SS and no TPC symbols
3) 16/SF SS and 16/SF TPC symbols

So, in case 3), when SF=1, there are 16 TPC symbols which correspond to 32 bits (for QPSK) and 48 bits (for 8PSK).

In the following the uplink is described only. For the description of the downlink, downlink (DL) and uplink (UL) have to be interchanged.

Each of the TPC symbols for uplink power control in the DL will be associated with an UL time slot and an UL CCTrCH pair. This association varies with

- the number of allocated UL time slots and UL CCTrCHs on these time slots (time slot and CCTrCH pair) and
- the allocated TPC symbols in the DL.

In case a UE has

- more than one channelisation code

and/or

- channelisation codes being of lower spreading factor than 16 and using 16/SF SS and 16/SF TPC symbols,

the TPC commands for each ULtime slot CCTrCH pair (all channelisation codes on that time slot belonging to the same time slot and CCTrCH pair have the same TPC command) will be distributed to the following rules:

1. The UL time slots and CCTrCH pairs the TPC commands are intended for will be numbered ~~form~~ from the first to the last UL time slot and CCTrCH pair allocated to the regarded UE (starting with 0). The number of a time slot and CCTrCH pair is smaller then the number of another time slot and CCTrCH pair within the same time slot if its spreading code with the lowest SC number according to the following table has a lower SC number then the spreading code with the lowest SC number of the other time slot and CCTrCH pair.

2. The commanding TPC symbols on all DL_CCTrCHs allocated to one UE are numbered consecutively starting with zero according to the following rules:

   a) The numbers of the TPC commands of a regarded DL time slot are lower than those of DL time slots being transmitted after that time slot

   b) Within a DL time slot the numbers of the TPC commands of a regarded channelisation code are lower than those of channelisation codes having a higher spreading code number

      The spreading code number is defined by the following table (see[8]):

SC number	SF (Q)	Walsh code number (k)
0	16	$\mathbf{c}_{Q=16}^{(k=1)}$
	...	
15	16	$\mathbf{c}_{Q=16}^{(k=16)}$
16	8	$\mathbf{c}_{Q=8}^{(k=1)}$
	…	
23	8	$\mathbf{c}_{Q=8}^{(k=8)}$
24	4	$\mathbf{c}_{Q=4}^{(k=1)}$
	…	
27	4	$\mathbf{c}_{Q=4}^{(k=4)}$
28	2	$\mathbf{c}_{Q=2}^{(k=1)}$
29	2	$\mathbf{c}_{Q=2}^{(k=2)}$
30	1	$\mathbf{c}_{Q=1}^{(k=1)}$

Note: Spreading factors 2-8 are not used in DL

   c) Within a channelisation code numbers of the TPC commands are lower than those of TPC commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded TPC symbol in the DL:

$$UL_{pos} = (SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos}) \bmod (N_{ULslot}),$$

where

UL_{pos} is the number of the controlled uplink time slot and CCTrCH pairs.

SFN' is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN' by

SFN=SFN' div 2, where div is the remainder free division operation.

$N_{UL\_PCsymbols}$ is the number of UL TPC symbols in a sub-frame.

TPC_{DLpos} is the number of the regarded UL TPC symbol in the DL within the sub-frame.

N_{ULslot} is the number of UL slots and CCTrCH pairs in a frame.

In Annex G two examples of the association of TPC commands to time slots and CCTrCH pairs are shown.

Coding of TPC:

The relationship between the TPC Bits and the transmitter power control command for QPSK is the same as in the 3.84Mcps TDD cf. [5.2.2.5 'Transmission of TPC'].

The relationship between the TPC Bits and the transmitter power control command for 8PSK is given in table 11

Table 11: TPC Bit Pattern for 8PSK

TPC Bits	TPC command	Meaning
000	'Down'	Decrease Tx Power
110	'Up'	Increase Tx Power

6.2.2.3 Transmission of SS

The burst type for dedicated channels provides the possibility for transmission of uplink synchronisation control (ULSC).

The transmission of ULSC is done in the data parts of the traffic burst. Hence the midamble structure and length is not changed. The ULSC information is to be transmitted directly after the midamble. Figure 26 shows the position of the SS command in a traffic burst.

For every user the ULSC information shall be transmitted at least once per transmitted sub-frame. By default the following rules apply:

1. If TFCI is applied for a CCTrCH, the SS command(s) shall be transmitted using the same channelisation code and the same timeslots as the TFCI.

2. If no TFCI is applied for a CCTrCH, the SS command(s) shall be transmitted using the first allocated channelisation code and the first allocated timeslot, according to the order in the higher layer allocation message.

Apart from the default rules other allocations of SS commands are possible according higher layer signalling – e.g. the transmission of more then one SS command (on more than one time slot).

The SS command is spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.

The SS is utilised to command a timing adjustment by (k/8) Tc each M sub-frames, where Tc is the chip period. The ~~default~~ k and M values are signalled by the network ~~by means of system information that is broadcast in the cell~~. The SS, as one of L1 signals, is to be transmitted once per 5ms sub-frame.

M (1-8) and k (1-8) can be adjusted during call setup or readjusted during the call.

Note: The smallest step for the SS signalled by the UTRAN is 1/8 Tc. For the UE capabilities regarding the SS adjustment of the UE it is suggested to set the tolerance for the executed command to be [1/9;1/7] Tc.

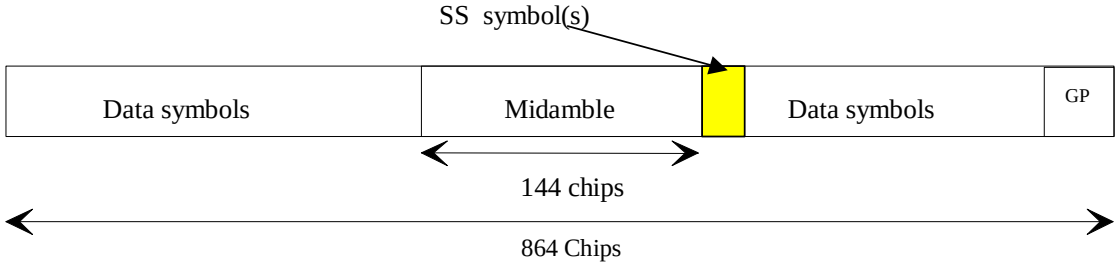

Figure 26: Position of ULSC information in the traffic burst (downlink and uplink)

Note that for the uplink where ~~there's~~ there is no SS symbol used, the SS symbol space is reserved for future use. This can keep UL and DL slots the same structure.

For the number of layer 1 symbols there are 3 possibilities configurable for each channelisation code during the call setup:

- one SS symbol
- no SS symbol
- 16/SF SS symbols

So, in case 3, when SF=1, there are 16 SS symbols which correspond to 32 bits (for QPSK) and 48 bits (for 8PSK).

Each of the SS symbols in the DL will be associated with an UL time slot depending on the allocated UL time slots and the allocated SS symbols in the DL.

Note: Even though the different time slots of the UE are controlled with independent SS commands, the UE is not in need to execute SS commands leading to a deviation of more than [3] chip with respect to the average timing advance applied by the UE.

The synchronisation shift commands for each UL time slot (all channelisation codes on that time slot have the same SS command) will be distributed to the following rules:

1. The UL time slots the SS commands are intended for will be numbered ~~form~~ from the first to the last UL time slot occupied by the regarded UE (starting with 0) considering all CCTrCHs allocated to that UE.
2. The commanding SS symbols on all downlink CCTrCHs allocated to one UE are numbered consecutively starting with zero according to the following rules:
   a) The numbers of the SS commands of a regarded DL time slot are lower than those of DL time slots being transmitted after that time slot
   b) Within a DL time slot the numbers of the SS commands of a regarded channelisation code are lower than those of channelisation codes having a bigger spreading code number

      The spreading code number is defined by the following table: (see TS 25.223)

Spreading code number	SF (Q)	Walsh code number (k)
0	16	$\mathbf{c}_{Q=16}^{(k=1)}$
	...	
15	16	$\mathbf{c}_{Q=16}^{(k=16)}$
	Spreading factors 2-8 are nor used in DL	
30	1	$\mathbf{c}_{Q=1}^{(k=1)}$

   c) Within a channelisation code numbers of the SS commands are lower than those of SS commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded SS symbol:

$$UL_{pos} = (SFN' \cdot N_{SSsymbols} + SS_{pos}) \bmod (N_{ULslot}),$$

where

UL_{pos} is the number of the controlled uplink time slot.

SFN' is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN' by

SFN=SFN' div 2, where div is the remainder free division operation.

$N_{SSsymbols}$ is the number of SS symbols in a frame.

SS_{pos} is the number of the regarded SS symbol within the sub-frame.

N_{ULslot} is the number of UL slots in a frame.

The relationship between the SS Bits and the SS command for QPSK is the given in table 12:

Table 12: Coding of the SS for QPSK

SS Bits	SS command	Meaning
00	'Down'	Decrease synchronisation shift by k/8 Tc
11	'Up'	Increase synchronisation shift by k/8 Tc
01	'Do nothing'	No change

The relationship between the SS Bits and the SS command for 8PSK is given in table 13:

Table 13: Coding of the SS for 8PSK

SS Bits	SS command	Meaning
000	'Down'	Decrease synchronisation shift by k/8 Tc
110	'Up'	Increase synchronisation shift by k/8 Tc
011	'Do nothing'	No change

6.3.3 Fast Physical Access CHannel (FPACH)

The Fast Physical Access CHannel (FPACH) is used by the Node B to carry, in a single burst, the acknowledgement of a detected signature with timing and power level adjustment indication to a user equipment. FPACH makes use of one ~~resource unit~~code ~~only at~~with spreading factor 16, so that its burst is composed by 44 symbols. The spreading code, training sequence and time slot position are configured by the network and signalled on the BCH.

6.3.6 Physical Uplink Shared Channel (PUSCH)

For Physical Uplink Shared Channel (PUSCH) the burst structure of DPCH as described in subclause 6.2 shall be used. ~~User specific physical layer parameters like power control, timing advance or directive antenna settings are derived from the associated channel (FACH or DCH)~~. PUSCH provides the possibility for transmission of TFCI in uplink.

6.3.7 Physical Downlink Shared Channel (PDSCH)

For Physical Downlink Shared Channel (PDSCH) the burst structure of DPCH as described in subclause 6.2 shall be used. ~~User specific physical layer parameters like power control or directive antenna settings are derived from the associated channel (FACH or DCH).~~ PDSCH provides the possibility for transmission of TFCI in downlink.

To indicate to the UE that there is data to decode on the DSCH, three signalling methods are available:

1) using the TFCI field of the associated channel or PDSCH;

2) using on the DSCH user specific midamble derived from the set of midambles used for that cell;

3) using higher layer signalling.

When the midamble based method is used, the UE shall decode the PDSCH if the PDSCH was transmitted with the midamble assigned to the UE by UTRAN, see 6.6.1.1.2 . For this method no other physical channels may use the same time slot as the PDSCH and only one UE may share the PDSCH time slot at the same time.

8.2.4 The Random Access Channel (RACH)

The RACH ~~has intraslot interleaving only and~~ is mapped onto PRACH. More than one slot per frame may be administered for the PRACH. The location of slots allocated to PRACH is broadcast on the BCH. The uplink sync codes (SYNC-UL sequences) used by the UEs for UL synchronisation have a well known association with the P-RACHs, as broadcast on the BCH. On the PRACH, both power control and uplink synchronisation control are used.