TSG RAN Meeting #28 **RP-050239**
Quebec, Canada, 1 - 3 June 2005

Title **CRs (Rel-4 category F, Rel-5 category A, Rel-6 category A) to TS 25.221 for Correction to transmission of TPC for 1.28 Mcps TDD**
Source **TSG RAN WG1**
Agenda Item **7.2.4**

RAN1 Tdoc	Spec	CR	Rev	Rel	Cat	Current Version	Subject	Work item	Remarks
R1-050517	25.221	128	1	Rel-4	F	4.7.0	Correction to transmission of TPC for 1.28 Mcps TDD	LCRTDD-Phys	
R1-050517	25.221	129	1	Rel-5	A	5.5.0	Correction to transmission of TPC for 1.28 Mcps TDD	LCRTDD-Phys	
R1-050517	25.221	130	1	Rel-6	A	6.3.0	Correction to transmission of TPC for 1.28 Mcps TDD	LCRTDD-Phys	

3GPP TSG-RAN WG1 Meeting #41
Athens, Greece, May 9th-13rd, 2005

Tdoc ⌘R1-050517

CR-Form-v7

CHANGE REQUEST

⌘ **TS25.221** **CR** **128** ⌘ **rev** **1** ⌘ Current version: **4.7.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Correction to transmission of TPC for 1.28 Mcps TDD
Source:	⌘	RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	09/05/2005
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Incorrect definition of parameter N_{ULslot} in TPC transmission for TDD. It is supposed to be defined on the basis of sub-frame rather than frame. For every user the TPC information is to be transmitted at least once per 5ms sub-frame, therefore, the N_{ULslot} should be the number of Uplink timeslot and CCTrCH pairs in a sub-frame, not in a frame as it said now.
Summary of change:	⌘	Change the definition of N_{ULslot} as follow, N_{ULslot} is the number of UL slots and CCTrCH pairs in a sub-frame Isolated Impact Analysis: The only impact is on the association between TPC command and its controlled timeslot and CCTrCH pair(s).
Consequences if not approved:	⌘	Cause misunderstandings on the equation which is used to determine the UL timeslot and CCTrCH pairs controlled by the regarded TPC symbol in the DL.

Clauses affected:	⌘	5A.2.2.2

Other specs affected:	⌘	Y	N		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5A.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 18G 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. For each allocated timeslot it is signalled individually whether that timeslot carries TPC information or not. If applied in a timeslot, transmission of TPC symbols is done in the data parts of the traffic burst and they are transmitted using the physical channel with the lowest physical channel sequence number (p) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].
TPC symbols may also be transmitted on more than one physical channel in a time slot. For this purpose, higher layers allocate an additional number of N_{TPC} physical channels, individually for each time slot. The TPC symbols shall then be transmitted using the physical channels with the $N_{TPC}+1$ lowest physical channel sequence numbers (p) in that time slot. Physical channel sequence numbering is determined by the rate matching function and is described in [7]. If the rate matching function results in $N_{RM} < N_{TPC}+1$ remaining physical channels in this time slot, TPC symbols shall be transmitted only on the N_{RM} remaining physical channels.
The TPC symbols are spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.

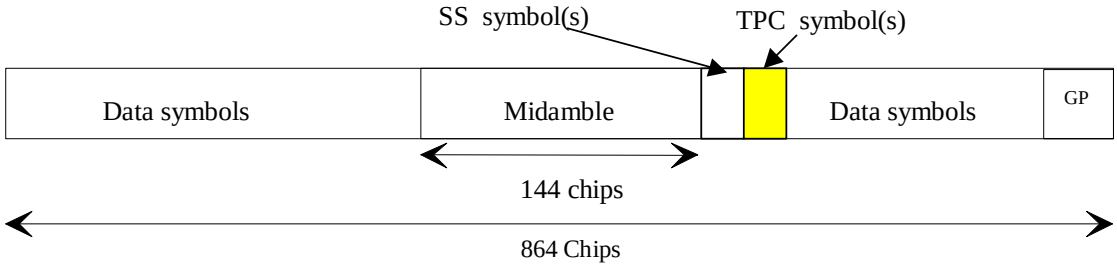

Figure 18G: Position of TPC information in the traffic burst in downlink and uplink

For the number of TPC symbols per time slot there are 3 possibilities, that can be configured by higher layers individually for each timeslot:

1) one TPC symbol
2) no TPC symbols
3) 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 ULtime slots and CCTrCH pairs the TPC commands are intended for will be numbered from the first to the last ULtime 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:

,

$$UL_{pos} = \left(SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos} + \left(\left(SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos}\right) \mathrm{div} \left(N_{ULslot}\right)\right)\right) \mathrm{mod} \left(N_{ULslot}\right)$$

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~~ sub-frame.

When one of the above parameters is changed due to higher layer reconfiguration, the new relationship between TPC symbols and controlled UL time slots shall be valid, beginning with the radio frame, for which the new parameters are set.

In Annex CB 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 8C

Table 8C: TPC Bit Pattern for 8PSK

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

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CHANGE REQUEST

⌘ **TS25.221** **CR** **129** ⌘ **rev** **1** ⌘ Current version: **5.5.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Correction to transmission of TPC for 1.28 Mcps TDD
Source:	⌘	RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	09/05/2005
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
- ***F*** *(correction)*
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Reason for change:	⌘	Incorrect definition of parameter N_{ULslot} in TPC transmission for TDD. It is supposed to be defined on the basis of sub-frame rather than frame. For every user the TPC information is to be transmitted at least once per 5ms sub-frame, therefore, the N_{ULslot} should be the number of Uplink timeslot and CCTrCH pairs in a sub-frame, not in a frame as it said now.
Summary of change:	⌘	Change the definition of N_{ULslot} as follow, N_{ULslot} is the number of UL slots and CCTrCH pairs in a sub-frame Isolated Impact Analysis: The only impact is on the association between TPC command and its controlled timeslot and CCTrCH pair(s).
Consequences if not approved:	⌘	Cause misunderstandings on the equation which is used to determine the UL timeslot and CCTrCH pairs controlled by the regarded TPC symbol in the DL.

Clauses affected:	⌘	5A.2.2.2

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

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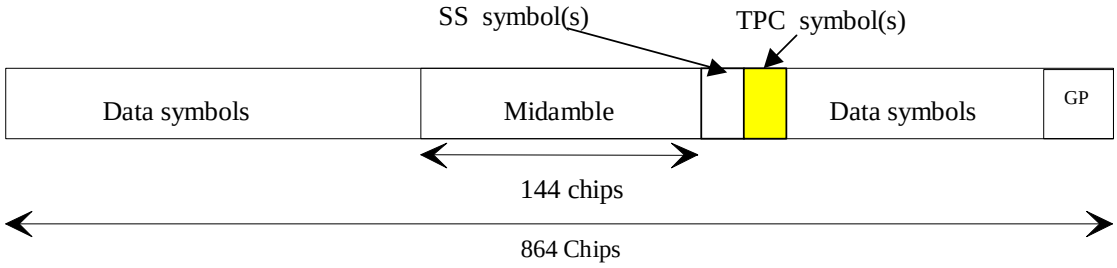

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Each of the TPC symbols for uplink power control in the DL will be associated with an UL time slot and an UL CCTrCH pair. This association varies with

- 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.

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same time slot and CCTrCH pair have the same TPC command) will be distributed to the following rules:

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

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15	16	$\mathbf{c}_{Q=16}^{(k=16)}$
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	…	
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:

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

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Tdoc ⌘R1-050517

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CHANGE REQUEST

⌘ **TS25.221** **CR** **130** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Correction to transmission of TPC for 1.28 Mcps TDD
Source:	⌘	RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	09/05/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

Use one of the following categories:
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Consequences if not approved:	⌘	Cause misunderstandings on the equation which is used to determine the UL timeslot and CCTrCH pairs controlled by the regarded TPC symbol in the DL.

Clauses affected:	⌘	5A.2.2.2

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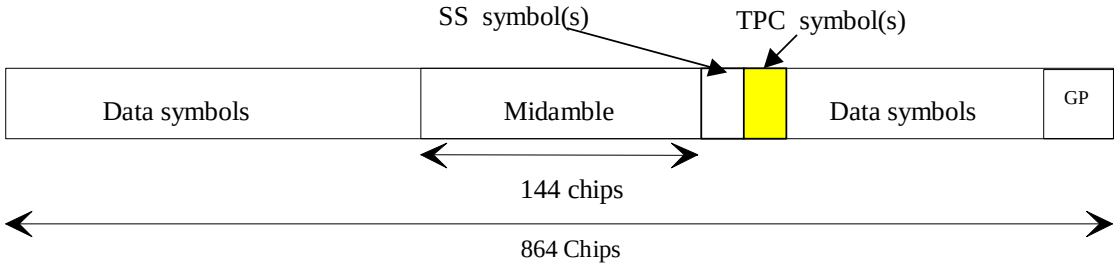
The TPC symbols are spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.



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

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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:

,

$$UL_{pos} = \left(SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos} + \left(\left(SFN' \cdot N_{UL\_TPCsymbols} + TPC_{DLpos}\right) \mathrm{div} \left(N_{ULslot}\right)\right)\right) \mathrm{mod} \left(N_{ULslot}\right)$$

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~~ sub-frame.

When one of the above parameters is changed due to higher layer reconfiguration, the new relationship between TPC symbols and controlled UL time slots shall be valid, beginning with the radio frame, for which the new parameters are set.

In Annex CB 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 8C

Table 8C: TPC Bit Pattern for 8PSK

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