TSG-RAN Meeting #6 **_TSGRP#6(99)684_**
Nice, France, 13 – 15 December 1999

Title: **Corrected CRs to TS 25.211 and additional CR to TS 25.214**

Source: **TSG-RAN WG1**

Agenda item: **5.1.3**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc
25.211	005	1	R99	Editorial Corrections	F	3.0.0	3.1.0	R1-99l07
25.211	009	1	R99	20ms RACH message length	B	3.0.0	3.1.0	R1-99l21
25.214	023	1	R99	Maximum Tx power at compressed mode	F	3.0.0	3.1.0	R1-99k69

NOTE: The source of this document is TSG-RAN WG1. The source shown on each CR cover sheet is the originating organisation.

3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, Nov 30 - Dec 3, 1999

Document R1-99L07
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.

25.211	**CR**	**005r1**	Current Version:	3.0.0

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

For submission to:	TSG-RAN #6	for approval	X	strategic	(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	

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	UTRAN / Radio	Core Network
	X	X	

Source:	Ericsson	**Date:**	1999-12-02
Subject:	Editorial corrections		
Work item:	TS25.211		

Category: *(only one category shall be marked with an X)*

			Release:	
F	Correction	X	Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature		Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change: Several editorial corrections are collected in this CR.

Clauses affected: 3.3, 5.2.1, 5.3.2, 5.3.3.1.2, 5.3.3.2, 5.3.3.3, 5.3.3.7, 6, 7.6.3 of TS25.211

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:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

3.3 Abbreviations

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

AI	Acquisition Indicatior
AICH	Acquisition Indication Channel
AP	Access Preamble
BCH	Broadcast Channel
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CD	Collision Detection
CPCH	Common Packet Channel
CPICH	Common Pilot Channel
DCH	Dedicated Channel
DPCCH	Dedicated Physical Control Channel
DPCH	Dedicated Physical Channel
DPDCH	Dedicated Physical Data Channel
DSCH	Downlink Shared Channel
DTX	Discontinuous Transmission
FACH	Forward Access Channel
FBI	Feedback Information
MUI	Mobile User Identifier
PCH	Paging Channel
P-CCPCH	Primary Common Control Physical Channel
PCPCH	Physical Common Packet Channel
PDSCH	Physical Downlink Shared Channel
PI	Page Indicatior
PICH	Page Indication Channel
PRACH	Physical Random Access Channel
PSC	Primary Synchronisation Code
RACH	Random Access Channel
RNC	Radio Network Controller
S-CCPCH	Secondary Common Control Physical Channel
SCH	Synchronisation Channel
SF	Spreading Factor
SFN	System Frame Number
SSC	Secondary Synchronisation Code
STTD	Space Time Transmit Diversity
TFCI	Transport Format Combination Indicator
TSTD	Time Switched Transmit Diversity
TPC	Transmit Power Control
UE	User Equipment
UTRAN	UMTS Terrestrial Radio Access Network

5.2.1 Dedicated uplink physical channels

There are two types of uplink dedicated physical channels, the uplink Dedicated Physical Data Channel (uplink DPDCH) and the uplink Dedicated Physical Control Channel (uplink DPCCH).

The DPDCH and the DPCCH are I/Q code multiplexed within each radio frame (see [4]).

The uplink DPDCH is used to carry dedicated data generated at Layer 2 and above, i.e. the dedicated transport channel (DCH). There may be zero, one, or several uplink DPDCHs on each Layer 1 connection.

The uplink DPCCH is used to carry control information generated at Layer 1. The Layer 1 control information consists of known pilot bits to support channel estimation for coherent detection, transmit power-control (TPC) commands, feedback information (FBI), and an optional transport-format combination indicator (TFCI). The transport-format combination indicator informs the receiver about the instantaneous parameters of the different transport channels multiplexed on the uplink DPDCH, and corresponds to the data transmitted in the same frame. It is the UTRAN that determines if a TFCI should be transmitted, hence making it ~~is~~ mandatory for all UEs to support the use of TFCI in the uplink. There is one and only one uplink DPCCH on each Layer 1 connection.

Figure 1 shows the frame structure of the uplink dedicated physical channels. Each frame of length 10 ms is split into 15 slots, each of length T_{slot} = 2560 chips, corresponding to one power-control period. A super frame corresponds to 72 consecutive frames, i.e. the super-frame length is 720 ms.

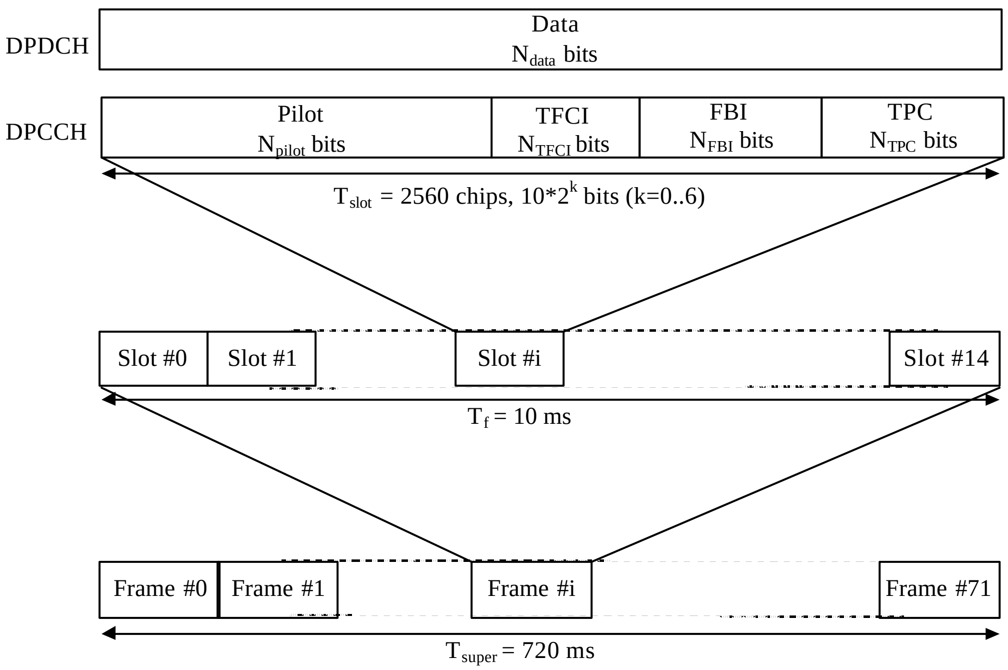

Figure 1: Frame structure for uplink DPDCH/DPCCH

The parameter k in figure 1 determines the number of bits per uplink DPDCH/DPCCH slot. It is related to the spreading factor SF of the physical channel as $SF = 256/2^k$. The DPDCH spreading factor may thus range from 256 down to 4. Note that an uplink DPDCH and uplink DPCCH on the same Layer 1 connection generally are of different rates, i.e. have different spreading factors and different values of k.

The exact number of bits of the different uplink DPCCH fields (N_{pilot}, N_{TFCI}, N_{FBI}, and N_{TPC}) is determined in table 2. The field order and total number of bits/slot are fixed, though the number of bits per field may vary during a connection.

The values for the number of bits per field are given in table 1 and table 2. The channel bit and symbol rates given in table 1 are the rates immediately before spreading. The pilot patterns are given in table 3 and table 4, the TPC bit pattern is given in table 5.

The N_{FBI} bits are used to support techniques requiring feedback between the UE and the UTRAN Access Point (=cell transceiver), including closed loop mode transmit diversity and site selection diversity (SSDT). The exact details of the

FBI field are shown in figure 2 and described below.

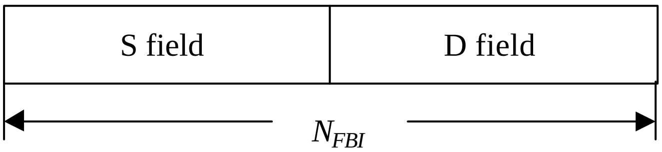

Figure 2: Details of FBI field

The S field is used for SSDT signalling, while the D field is used for ~~FB~~ Closed Loop Mode Transmit Diversity ~~S~~signalling. ~~Each of t~~The S field can be of length 0, 1 or 2. ~~and~~ The D field~~s~~ can be of length 0~~,~~ or 1. ~~or 2, with a~~ The total FBI field size N_{FBI} is according to table 2 (DPCCH fields). Simultaneous use of SSDT power control and ~~FB~~ Closed Loop Mode Transmit Diversity requires that ~~both~~ the S ~~and D~~ field~~s~~ ~~be~~ is of length 1. The use of these FBI fields is described in [5].

5.3.2 Dedicated downlink physical channels

There is only one type of downlink dedicated physical channel, the Downlink Dedicated Physical Channel (downlink DPCH).

Within one downlink DPCH, dedicated data generated at Layer 2 and above, i.e. the dedicated transport channel (DCH), is transmitted in time-multiplex with control information generated at Layer 1 (known pilot bits, TPC commands, and an optional TFCI). The downlink DPCH can thus be seen as a time multiplex of a downlink DPDCH and a downlink DPCCH, compare section 5.2.1. It is the UTRAN that determines if a TFCI should be transmitted, hence making it is mandatory for all UEs to support the use of TFCI in the downlink.

Figure 10 shows the frame structure of the downlink DPCH. Each frame of length 10 ms is split into 15 slots, each of length T_{slot} = 2560 chips, corresponding to one power-control period. A super frame corresponds to 72 consecutive frames, i.e. the super-frame length is 720 ms.

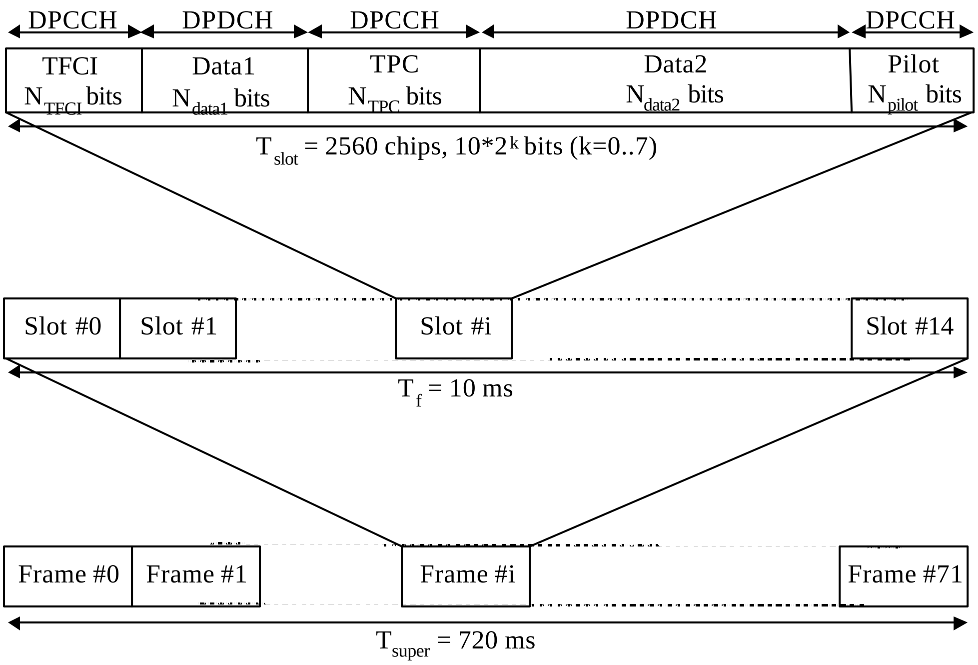

Figure 10: Frame structure for downlink DPCH

The parameter k in figure 10 determines the total number of bits per downlink DPCH slot. It is related to the spreading factor SF of the physical channel as SF = $512/2^k$. The spreading factor may thus range from 512 down to 4.

The exact number of bits of the different downlink DPCH fields (N_{pilot}, N_{TPC}, N_{TFCI}, N_{data1} and N_{data2}) is determined in table 11.The overhead due to the DPCCH transmission has to be negotiated at the connection set-up and can be re-negotiated during the communication, in order to match particular propagation conditions.

There are basically two types of downlink Dedicated Physical Channels; those that include TFCI (e.g. for several simultaneous services) and those that do not include TFCI(e.g. for fixed-rate services). These types are reflected by the duplicated rows of table 11. The channel bit and symbol rates given in table 11 are the rates immediately before spreading.

Table 11: DPDCH and DPCCH fields

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/Frame			Bits/ Slot	DPDCH Bits/Slot		DPCCH Bits/Slot		
				DPDCH	DPCCH	TOT		N_{Data1}	N_{Data2}	N_{TFCI}	N_{TPC}	N_{Pilot}
0	15	7.5	512	60	90	150	10	2	2	0	2	4
1	15	7.5	512	30	120	150	10	0	2	2	2	4
2	30	15	256	240	60	300	20	2	14	0	2	2
3	30	15	256	210	90	300	20	0	14	2	2	2
4	30	15	256	210	90	300	20	2	12	0	2	4
5	30	15	256	180	120	300	20	0	12	2	2	4
6	30	15	256	150	150	300	20	2	8	0	2	8
7	30	15	256	120	180	300	20	0	8	2	2	8
8	60	30	128	510	90	600	40	6	28	0	2	4
9	60	30	128	480	120	600	40	4	28	2	2	4
10	60	30	128	450	150	600	40	6	24	0	2	8
11	60	30	128	420	180	600	40	4	24	2	2	8
12	120	60	64	900	300	1200	80	4	56	8*	4	8
13	240	120	32	2100	300	2400	160	20	120	8*	4	8
14	480	240	16	4320	480	4800	320	48	240	8*	8	16
15	960	480	8	9120	480	9600	640	112	496	8*	8	16
16	1920	960	4	18720	480	19200	1280	240	1008	8*	8	16

* If TFCI bits are not used, then DTX shall be used in TFCI field.

The pilot symbol pattern is described in table 12. The shadowed part can be used as frame synchronization words. (The symbol pattern of the pilot symbols other than the frame synchronization word shall be "11".) In table 12, the transmission order is from left to right. (Each two-bit pair represents an I/Q pair of QPSK modulation.)

Table 12: Pilot Symbol Pattern

	N_{pilot} = 2	N_{pilot} = 4		N_{pilot} = 8				N_{pilot} = 16							
Symbol #	0	0	1	0	1	2	3	0	1	2	3	4	5	6	7
Slot #0	11	11	11	11	11	11	10	11	11	11	10	11	11	11	10
1	00	11	00	11	00	11	10	11	00	11	10	11	11	11	00
2	01	11	01	11	01	11	01	11	01	11	01	11	10	11	00
3	00	11	00	11	00	11	00	11	00	11	00	11	01	11	10
4	10	11	10	11	10	11	01	11	10	11	01	11	11	11	11
5	11	11	11	11	11	11	10	11	11	11	10	11	01	11	01
6	11	11	11	11	11	11	00	11	11	11	00	11	10	11	11
7	10	11	10	11	10	11	00	11	10	11	00	11	10	11	00
8	01	11	01	11	01	11	10	11	01	11	10	11	00	11	11
9	11	11	11	11	11	11	11	11	11	11	11	11	00	11	11
10	01	11	01	11	01	11	01	11	01	11	01	11	11	11	10
11	10	11	10	11	10	11	11	11	10	11	11	11	00	11	10
12	10	11	10	11	10	11	00	11	10	11	00	11	01	11	01
13	00	11	00	11	00	11	11	11	00	11	11	11	00	11	00
14	00	11	00	11	00	11	11	11	00	11	11	11	10	11	01

The relationship between the TPC symbol and the transmitter power control command is presented in table 13.

Table 13: TPC Bit Pattern

TPC Bit Pattern			Transmitter power control command
N_{TPC} = 2	N_{TPC} = 4	N_{TPC} = 8	
11	1111	11111111	1
00	0000	00000000	0

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain combination of bit rates of the DCHs currently in use. This correspondence is (re-)negotiated at each DCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

5.3.3.1.2 Secondary Common Pilot Channel

A Secondary Common Pilot Channel the following characteristics:

- Can use an arbitrary channelization code of SF=256, see [4]
- Scrambled by either the primary or a secondary scrambling code, see [4]
- Zero, one, or several per cell
- May be transmitted over only a part of the cell
- A Secondary CPICH may be the reference for the Secondary CCPCCH and the downlink DPCH. If this is the case, the UE is informed about this by higher-layer signalling.

5.3.3.2 Primary Common Control Physical Channel (P-CCPCH)

The Primary CCPCH is a fixed rate (30 kbps, SF=256) downlink physical channels used to carry the BCH.

Figure 15 shows the frame structure of the Primary CCPCH. The frame structure differs from the downlink DPCH in that no TPC commands, no TFCI and no pilot bits are transmitted. The Primary CCPCH is not transmitted during the first 256 chips of each slot. Instead, Primary SCH and Secondary SCH are transmitted during this period (see section 5.3.3.4).

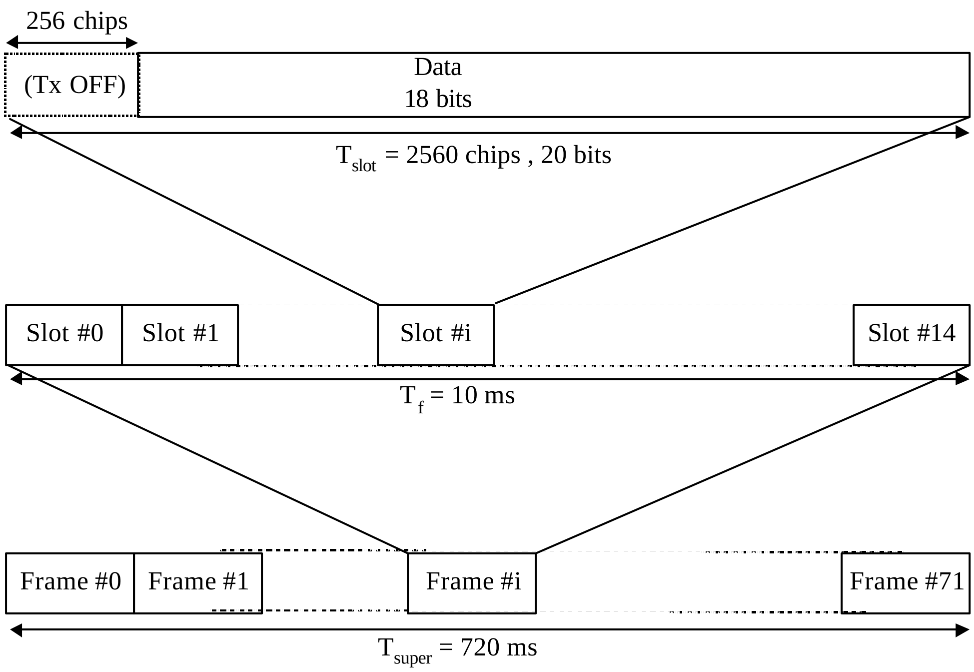

Figure 15: Frame structure for Primary Common Control Physical Channel

5.3.3.3 Secondary Common Control Physical Channel (S-CCPCH)

The Secondary CCPCH is used to carry the FACH and PCH. There are two types of Secondary CCPCH: those that include TFCI and those that do not include TFCI. It is the UTRAN that determines if a TFCI should be transmitted, hence making it mandatory for all UEs to support the use of TFCI. The set of possible rates is the same as for the downlink DPCH, see section 5.3.2. The frame structure of the Secondary CCPCH is shown in figure 17.

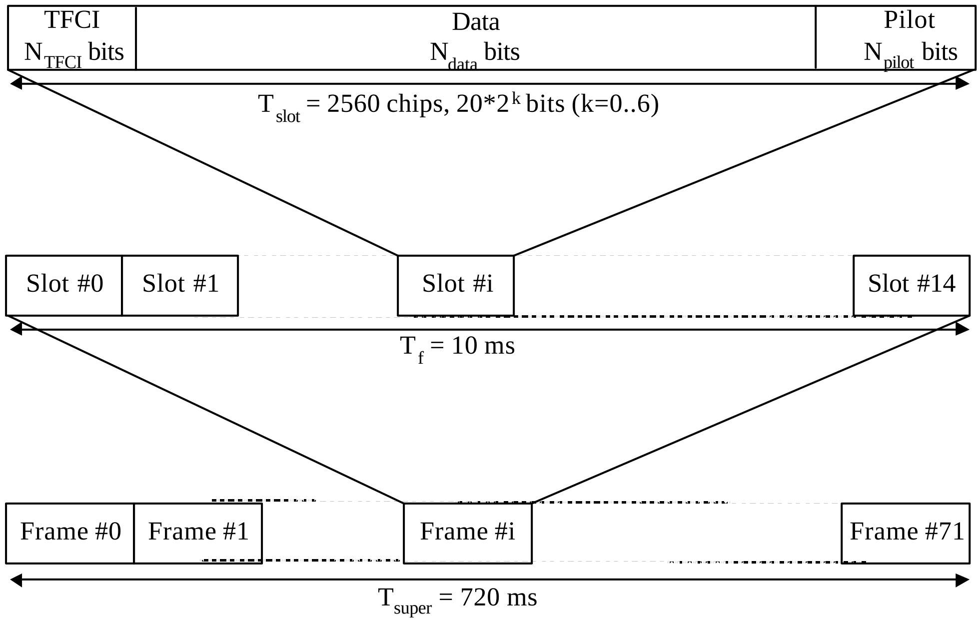

Figure 17: Frame structure for Secondary Common Control Physical Channel

The parameter k in figure 17 determines the total number of bits per downlink Secondary CCPCH slot. It is related to the spreading factor SF of the physical channel as $SF = 256/2^k$. The spreading factor range is from 256 down to 4.

The values for the number of bits per field are given in table 16 ~~and table 17~~. The channel bit and symbol rates given in table 16 are the rates immediately before spreading. The pilot patterns are given in table 18.

The FACH and PCH can be mapped to the same or to separate Secondary CCPCHs. If FACH and PCH are mapped to the same Secondary CCPCH, they can be mapped to the same frame. The main difference between a CCPCH and a downlink dedicated physical channel is that a CCPCH is not inner-loop power controlled. The main difference between the Primary and Secondary CCPCH is that the Primary CCPCH has a fixed predefined rate while the Secondary CCPCH can support variable rate with the help of the TFCI field included. Furthermore, a Primary CCPCH is continuously transmitted over the entire cell while a Secondary CCPCH is only transmitted when there is data available and may be transmitted in a narrow lobe in the same way as a dedicated physical channel (only valid for a Secondary CCPCH carrying the FACH).

Table 16: Secondary CCPCH fields~~ with pilot bits~~

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{data}	N_{pilot}	N_{TFCI}
0	30	15	256	300	20	20	0	0
~~0~~1	30	15	256	300	20	12	8	0
2	30	15	256	300	20	18	0	2
3~~1~~	30	15	256	300	20	10	8	2
4	60	30	128	600	40	40	0	0
5~~2~~	60	30	128	600	40	32	8	0
6	60	30	128	600	40	38	0	2
7~~3~~	60	30	128	600	40	30	8	2
8	120	60	64	1200	80	72	0	8*
9~~4~~	120	60	64	1200	80	64	8	8*
10	240	120	32	2400	160	152	0	8*
11~~5~~	240	120	32	2400	160	144	8	8*
12	480	240	16	4800	320	312	0	8*
13~~6~~	480	240	16	4800	320	296	16	8*
14	960	480	8	9600	640	632	0	8*
15~~7~~	960	480	8	9600	640	616	16	8*
16	1920	960	4	19200	1280	1272	0	8*
17~~8~~	1920	960	4	19200	1280	1256	16	8*

* If TFCI bits are not used, then DTX shall be used in TFCI field.

~~**Table 17: Secondary CCPCH fields without pilot bits**~~

~~Slot Format #i~~	~~Channel Bit Rate (kbps)~~	~~Channel Symbol Rate (ksps)~~	~~SF~~	~~Bits/ Frame~~	~~Bits/ Slot~~	~~N_{data}~~	~~N_{pilot}~~	~~N_{TFCI}~~
~~0~~	~~30~~	~~15~~	~~256~~	~~300~~	~~20~~	~~20~~	~~0~~	~~0~~
~~1~~	~~30~~	~~15~~	~~256~~	~~300~~	~~20~~	~~18~~	~~0~~	~~2~~
~~2~~	~~60~~	~~30~~	~~128~~	~~600~~	~~40~~	~~40~~	~~0~~	~~0~~
~~3~~	~~60~~	~~30~~	~~128~~	~~600~~	~~40~~	~~38~~	~~0~~	~~2~~
~~4~~	~~120~~	~~60~~	~~64~~	~~1200~~	~~80~~	~~72~~	~~0~~	~~8*~~
~~5~~	~~240~~	~~120~~	~~32~~	~~2400~~	~~160~~	~~152~~	~~0~~	~~8*~~
~~6~~	~~480~~	~~240~~	~~16~~	~~4800~~	~~320~~	~~312~~	~~0~~	~~8*~~
~~7~~	~~960~~	~~480~~	~~8~~	~~9600~~	~~640~~	~~632~~	~~0~~	~~8*~~
~~8~~	~~1920~~	~~960~~	~~4~~	~~19200~~	~~1280~~	~~1272~~	~~0~~	~~8*~~

~~* If TFCI bits are not used, then DTX shall be used in TFCI field.~~

The pilot symbol pattern is described in table 18. The shadowed part can be used as frame synchronization words. (The symbol pattern of pilot symbols other than the frame synchronization word shall be "11"). In table 18, the transmission order is from left to right. (Each two-bit pair represents an I/Q pair of QPSK modulation.)

5.3.3.7 Page Indication Channel (PICH)

The Page Indicator Channel (PICH) is a fixed rate (SF=256) physical channel used to carry the Page Indicators (PI). The PICH is always associated with an S-CCPCH to which a PCH transport channel is mapped.

Figure 22 illustrates the frame structure of the PICH. One PICH frame of length 10 ms consists of 300 bits. Of these, 288 bits are used to carry Page Indicators. The remaining 12 bits are not used.

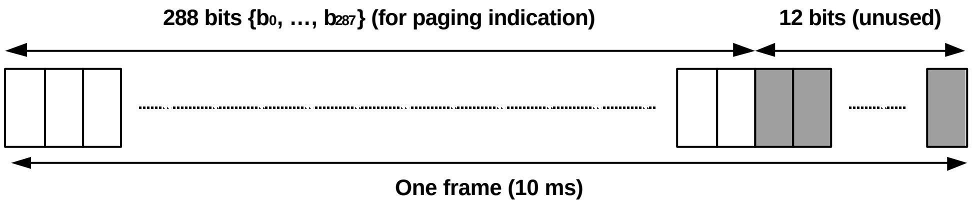

Figure 22: Structure of Page Indicator Channel (PICH)

N Page Indicators $\{PI_0, \ldots, PI_{N-1}\}$ are transmitted in each PICH frame, where N=18, 36, 72, or 144. The mapping from $\{PI_0, \ldots, PI_{N-1}\}$ to the PICH bits $\{b_0, \ldots, b_{287}\}$ are according to table 21.

Table 21: Mapping of Page Indicators (PI) to PICH bits

Number of PI per frame (N)	$PI_i = 1$	$PI_i = 0$
N=18	$\{b_{16i}, \ldots, b_{16i+15}\} = \{1,1,\ldots,1\}$	$\{b_{16i}, \ldots, b_{16i+15}\} = \{0,0,\ldots,0\}$
N=36	$\{b_{8i}, \ldots, b_{8i+7}\} = \{1,1,\ldots,1\}$	$\{b_{8i}, \ldots, b_{8i+7}\} = \{0,0,\ldots,0\}$
N=72	$\{b_{4i}, \ldots, b_{4i+3}\} = \{1, 1,\ldots,1\}$	$\{b_{4i}, \ldots, b_{4i+3}\} = \{0, 0,\ldots,0\}$
N=144	$\{b_{2i}, b_{2i+1}\} = \{1,1\}$	$\{b_{2i}, b_{2i+1}\} = \{0,0\}$

If a Paging Indicator in a certain frame is set to "1" it is an indication that UEs associated with this Page Indicator should read the corresponding frame of the associated S-CCPCH.

6 Mapping of transport channels onto physical channels

Figure 23 summarises the mapping of transport channels onto physical channels.

Transport Channels	**Physical Channels**
DCH	Dedicated Physical Data Channel (DPDCH)
	Dedicated Physical Control Channel (DPCCH)
RACH	Physical Random Access Channel (PRACH)
CPCH	Physical Common Packet Channel (PCPCH)
	Common Pilot Channel (CPICH)
BCH	Primary Common Control Physical Channel (P-CCPCH)
FACH	Secondary Common Control Physical Channel (S-CCPCH)
PCH	
	Synchronisation Channel (SCH)
DSCH	Physical Downlink Shared Channel (PDSCH)
	Acquisition Indication Channel (AICH)
	Page Indication Channel (PICH)

~~Transport Channels~~	~~Physical Channels~~
~~BCH~~	~~Primary Common Control Physical Channel (P-CCPCH)~~
~~FACH~~ ~~PCH~~	~~Secondary Common Control Physical Channel (S-CCPCH)~~
~~RACH~~	~~Physical Random Access Channel (PRACH)~~
~~CPCH~~	~~Physical Common Packet Channel (PCPCH)~~
~~DCH~~	~~Dedicated Physical Data Channel (DPDCH)~~
	~~Dedicated Physical Control Channel (DPCCH)~~
	~~Synchronisation Channel (SCH)~~
~~DSCH~~	~~Physical Downlink Shared Channel (PDSCH)~~
	~~Page Indication Channel (PICH)~~
	~~Acquisition Indication Channel (AICH)~~

Figure 23: Transport-channel to physical-channel mapping

The DCHs are coded and multiplexed as described in [3] , and the resulting data stream is mapped sequentially (first-in-first-mapped) directly to the physical channel(s). The mapping of BCH and FACH/PCH is equally straightforward, where the data stream after coding and interleaving is mapped sequentially to the Primary and Secondary CCPCH respectively. Also for the RACH, the coded and interleaved bits are sequentially mapped to the physical channel, in this case the message part of the random access burst on the PRACH.

7.6.3 Uplink/downlink timing at UE

At the UE, the uplink DPCCH/DPDCH frame transmission takes place approximately T_0 chips after the reception of the first significant path of the corresponding downlink DPCCH/DPDCH frame. T_0 is a constant defined to be 1024 chips. More information about the uplink/downlink timing relation and meaning of T_0 can be found in [5], section 4.5.

3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, Nov 30 – Dec 3, 1999

Document R1-99L21
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.

25.211	**CR**	**009R1**	Current Version:	3.0.0

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

For submission to:	TSG-RAN #6	for approval	X	strategic	(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	

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:	Nokia	**Date:**	2.12.99
Subject:	20 ms RACH message length		
Work item:			

Category:	F	Correction		**Release:**	Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature	X		Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:	Addition of 20 ms RACH message length was agreed in RAN WG1#8 (New York 12.-15.10). See documents R1-99f58 and R1-99h72.
Clauses affected:	5.2.2.1.1 and 5.2.2.1.3

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:	

5.2.2 Common uplink physical channels

5.2.2.1 Physical Random Access Channel (PRACH)

The Physical Random Access Channel (PRACH) is used to carry the RACH.

5.2.2.1.1 RACH transmission

The random-access transmission is based on a Slotted ALOHA approach with fast acquisition indication. The UE can start the transmission at a number of well-defined time-offsets, denoted *access slots*. There are 15 access slots per two frames and they are spaced 5120 chips apart. Timing information on the access slots and the acquisition indication is given in section 7.3. Figure 3 shows the access slot numbers and their spacing to each other. Information on what access slots are available in the current cell is given by higher layers.

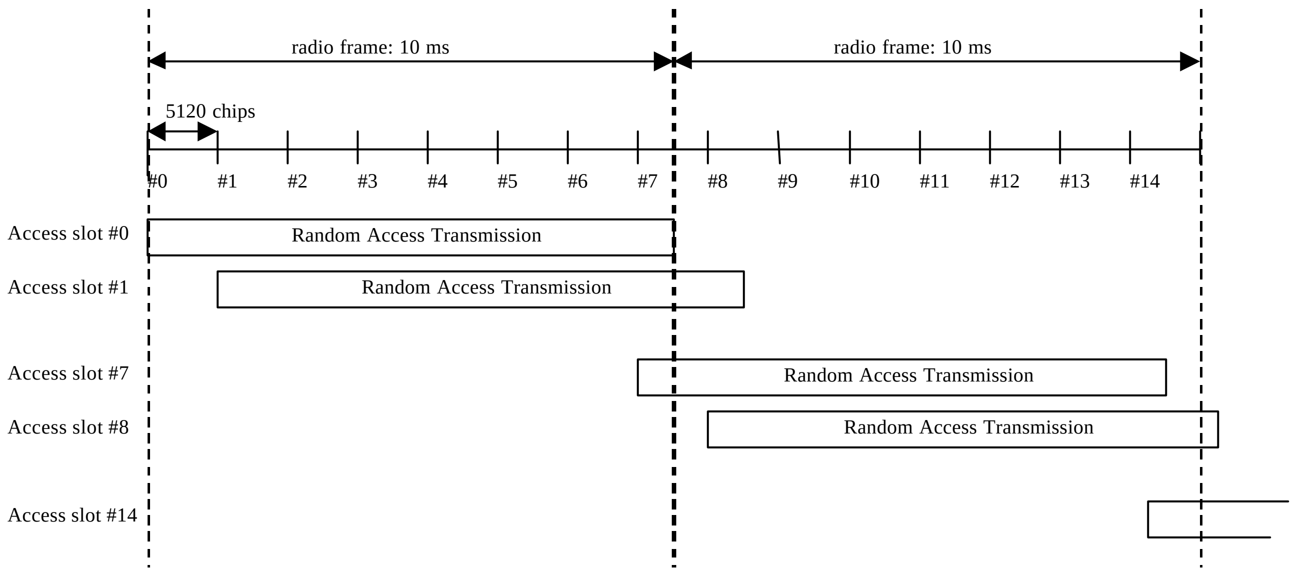

Figure 3: RACH access slot numbers and their spacing

The structure of the random-access transmission is shown in Figure 4. The random-access transmission consists of one or several *preambles* of length 4096 chips and a *message* of length 10 or 20 ms. The UE indicates the length of the message part to the network by using specific signatures and/or access slots. The assignment, which signatures and/or access slots are used for which message length, is performed by higher layers.

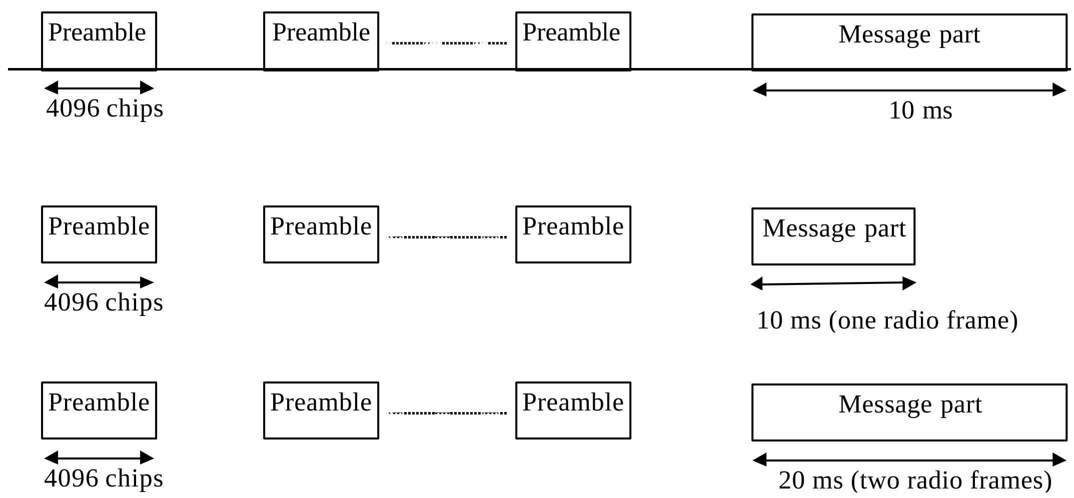

Figure 4: Structure of the random-access transmission.

5.2.2.1.2 RACH preamble part

The preamble part of the random-access burst consists of 256 repetitions of a signature. There are a total of 16 different signatures, based on the Hadamard code set of length 16 (see [4] for more details).

5.2.2.1.3 RACH message part

Figure 5 shows the structure of the Random-access message part radio frame. The 10 ms message part radio frame is split into 15 slots, each of length T_{slot} = 2560 chips. Each slot consists of two parts, a data part that carries Layer 2 information and a control part that carries Layer 1 control information. The data and control parts are transmitted in parallel. A 20 ms long message part consists of two consecutive message part radio frames.

The data part consists of $10*2^k$ bits, where k=0,1,2,3. This corresponds to a spreading factor of 256, 128, 64, and 32 respectively for the message data part.

The control part consists of 8 known pilot bits to support channel estimation for coherent detection and 2 TFCI bits. This corresponds to a spreading factor of 256 for the message control part. The pilot bit pattern is described in table 8. The total number of TFCI bits in the random-access message is 15*2 = 30. The TFCI value corresponds to a certain transport format of the current Random-access message.

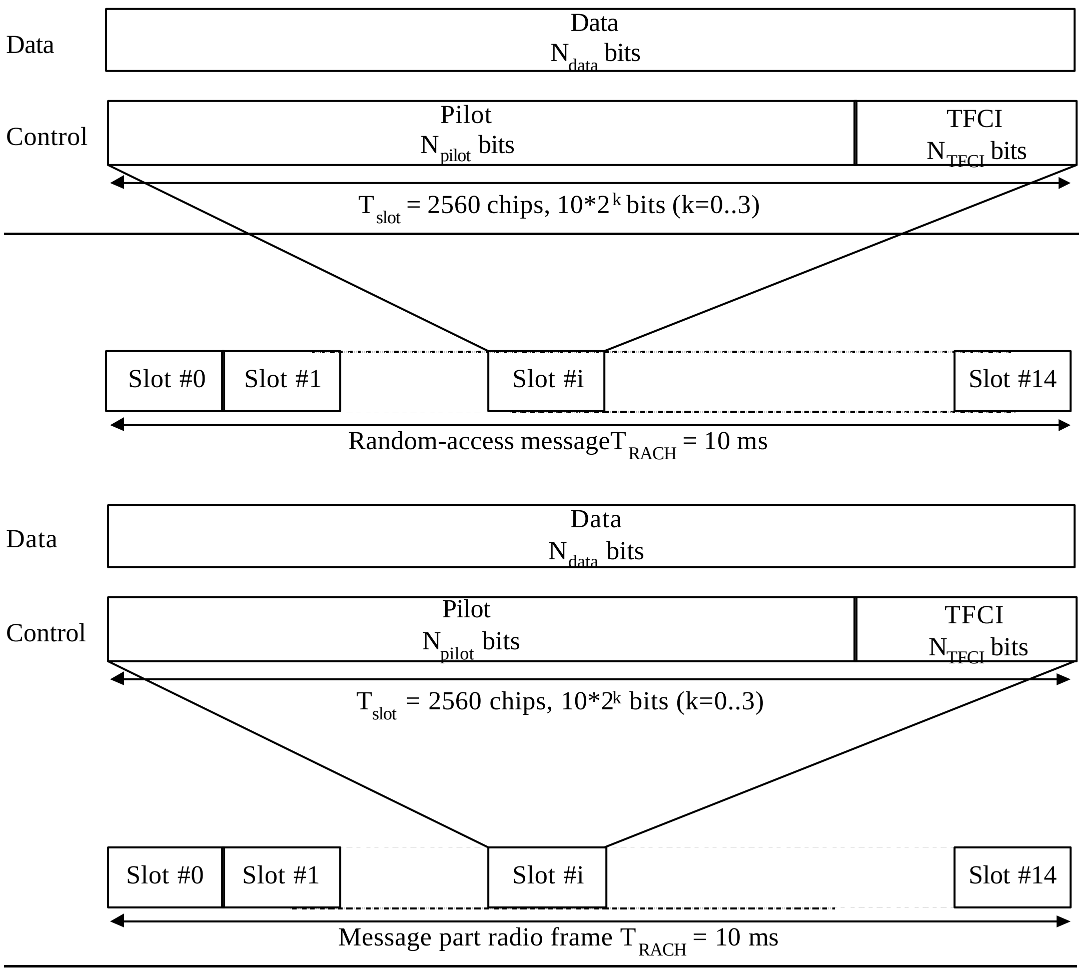

Figure 5: Structure of the random-access message part radio frame

Table 6: Random-access message data fields.

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{data}
0	15	15	256	150	10	10
1	30	30	128	300	20	20
2	60	60	64	600	40	40
3	120	120	32	1200	80	80

Table 7: Random-access message control fields

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{pilot}	N_{TFCI}
0	15	15	256	150	10	8	2

Table 8: Pilot bit patterns for RACH message part with N_{pilot} = 8.

	N_{pilot} = 8							
Bit #	0	1	2	3	4	5	6	7
Slot #0	1	1	1	1	1	1	1	0
1	1	0	1	0	1	1	1	0
2	1	0	1	1	1	0	1	1
3	1	0	1	0	1	0	1	0
4	1	1	1	0	1	0	1	1
5	1	1	1	1	1	1	1	0
6	1	1	1	1	1	0	1	0
7	1	1	1	0	1	0	1	0
8	1	0	1	1	1	1	1	0
9	1	1	1	1	1	1	1	1
10	1	0	1	1	1	0	1	1
11	1	1	1	0	1	1	1	1
12	1	1	1	0	1	0	1	0
13	1	0	1	0	1	1	1	1
14	1	0	1	0	1	1	1	1

TSG-RAN Working Group 1 meeting #9 **_TSGR1#9(99)k69_**
Dresden, Germany
November 30 – December 3, 1999

Agenda item:

Title: CR 25.214-023: Maximum TX power at uplink compressed mode, rev 1.

Source: Telia AB

Document for: Decision

Background

RAN-2 has defined a Layer 2 Information Element (IE) "Maximum allowed UL TX power" in their specifications. Nevertheless, there is no mentioning of this upper limit in any of the PC algorithms in TS 25.214 v3.0.0, hence the specification needs to be updated.

In R1-99i66 CR 25214-012, it is proposed how to deal with the information element in section 5.1.2.2 on ordinary transmit power control. In this document, a way forward for the handling of the information element in compressed mode is proposed.

Revision history

The difference between the original CR and revision 1 is that the word “allowed” has been inserted between “maximum” and “transmission power” in the last sentence of the CR.

3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, Nov 30 – Dec 3, 1999

***Document* R1#9(99)k69**
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.

25.214	**CR**	**023r1**	Current Version:	3.0.0

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

For submission to:	TSG-RAN #6	for approval	X	strategic		(for SMG
list expected approval meeting # here ↑		for information		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: Telia AB **Date:** 1999-12-01

Subject: Maximum Tx power at uplink compressed mode

Work item:

Category:				**Release:**	
	F	Correction	X	Phase 2	
	A	Corresponds to a correction in an earlier release		Release 96	
(only one category	B	Addition of feature		Release 97	
shall be marked	C	Functional modification of feature		Release 98	
with an X)	D	Editorial modification		Release 99	X
				Release 00	

Reason for change: RAN WG2 has in the RRC specifications defined an information element "Maximum allowed UL TX power". However the use of this parameter is not reflected in the current version of TS 25.214.

Clauses affected: 5.1.2.3

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: This CR is a follow up to CR 25.214-012 with the difference that it deals with compressed mode.

The UE first determines one temporary TPC command, TPC_temp_i, for each of the N sets of 3 TPC commands as follows:

- If all 3 hard decisions within a set are "1", $TPC\_temp_i = 1$
- If all 3 hard decisions within a set are "0", $TPC\_temp_i = -1$
- Otherwise, $TPC\_temp_i = 0$

Finally, the UE derives a combined TPC command for the third slot, TPC_cmd, as a function γ of all the N temporary power control commands TPC_temp_i:

TPC_cmd(3rd slot) = γ (TPC_temp_1, TPC_temp_2, …, TPC_temp_N), where TPC_cmd(3rd slot) can take the values 1, 0 or –1.

5.1.2.2.3.3.2 Example of the scheme

A particular example of the scheme is obtained when using the following definition of the function γ:

TPC_cmd is set to 1 if $\frac{1}{N}\sum_{i=1}^{N} TPC\_temp_i > 0.5$.

TPC_cmd is set to -1 if $\frac{1}{N}\sum_{i=1}^{N} TPC\_temp_i < -0.5$.

Otherwise, TPC_cmd is set to 0.

5.1.2.3 Transmit power control in compressed mode

The aim of uplink power control in downlink or/and uplink compressed mode is to recover as fast as possible a signal-to-interference ratio (SIR) close to the target SIR after each transmission gap.

In downlink compressed mode, no power control is applied during transmission gaps, since no downlink TPC command is sent. Thus, the transmit powers of the uplink DPDCH(s) and DPCCH are not changed during the transmission gaps.

In simultaneous downlink and uplink compressed mode, the transmission of uplink DPDCH(s) and DPCCH is stopped during transmission gaps.

The initial transmit power of each uplink DPDCH and DPCCH after the transmission gap is equal to the power before the gap, but with an offset Δ_{RESUME}. The value of Δ_{RESUME} (in dB) is determined according to the Power Resume Mode (PRM). The PRM is a UE specific parameter, which is signalled by the network with the other parameters of the downlink compressed mode (see TS 25.215). The different modes are summarised in table 1.

Table 1: Power control resume modes during compressed mode

Power Resume Mode	Description
0	$\Delta_{RESUME} = 0$
1	$\Delta_{RESUME} = \text{Int}[\delta_{last} / \Delta_{TPCmin}]\ \Delta_{TPCmin}$

Here Int[ ] means round to the nearest integer and Δ_{TPCmin} is the minimum power control step size supported by the UE. δ_{last} is the power offset computed at the last slot before the transmission gap according to the following recursive relations, which are, executed every slot during uplink transmission:

$$\delta_{last} = 0.9375\delta_{previous} - 0.96875 TPC\_cmd_{last}\Delta_{TPC}$$

$$\delta_{previous} = \delta_{last}$$

TPC_cmd is the power control command executed by the UE in the last slot before the transmission gap. $\delta_{previous}$ is the power offset computed for the previous slot. The value of $\delta_{previous}$ shall be initialised to zero when a DCH is activated, or during the first slot after a transmission gap.

After each transmission gap, 2 modes are possible for the power control algorithm. The power control mode (PCM) is fixed and signalled with the other parameters of the downlink compressed mode (see TS 25.215). The different modes are summarised in the table 2:

Table 2: Power control modes during compressed mode

Mode	Description
0	Ordinary transmit power control is applied with step size Δ_{TPC}
1	Ordinary transmit power control is applied with step size Δ_{RP-TPC} during RPL slots after each transmission gap.

For mode 0, the step size is not changed and the ordinary transmit power control is still applied during compressed mode (see subclause 5.1.2.2), using the same algorithm for processing TPC commands as in normal mode (see section 5.1.2.2.2 and 5.1.2.2.3).

For mode 1, during RPL slots after each transmission gap, called the recovery period, the same power control algorithm is applied but with a step size Δ_{RP-TPC} instead of Δ_{TPC}.

Δ_{RP-TPC} is called recovery power control step size and is expressed in dB. If algorithm 1 (section 5.1.2.2.2) is used in normal mode, Δ_{RP-TPC} is equal to the minimum value of 3 dB and $2\Delta_{TPC}$. If algorithm 2 (section 5.1.2.2.3) is used in normal mode, Δ_{RP-TPC} is equal to 1 dB.

RPL is called recovery period length and is expressed in number of slots. RPL is fixed and equal to the minimum value of TGL and 7 slots.

After the recovery period transmit power control resumes using the same algorithm and step size as used in normal mode before the transmission gap.

If algorithm 2 (section 5.1.2.2.3) is being used in normal mode, the sets of slots over which the TPC commands are processed (in section 5.1.2.2.2.3.1) shall remain aligned to the frame boundaries in the compressed frame. In both mode 0 or mode 1, if the transmission gap or the recovery period results in any incomplete sets of TPC commands, no TPC_temp_i command will be determined for those sets of slots which are incomplete, and there will be no change in transmit power level for those sets of slots.

During compressed mode and the recovery period after compressed mode, regardless of the offset Δ_{RESUME} and the step size Δ_{RP-TPC}, the UE transmit power shall not exceed the maximum allowed transmission power set by higher layer signalling.