# RP-010331

# TSG-RAN Meeting #12 Stockholm, Sweden, 12-15, June, 2001

Title: Agreed CRs (R99 and Rel-4 Category A) to TS 25.211

Source: TSG-RAN WG1

Agenda item: 8.1.3

No.	Spec	CR	Rev	R1 T-doc	Subject	Release	Cat	W / I Code	V_old	V_new
1	25.211	097	-	R1-01-0457	Downlink Phase Reference for DL-DPCCH for CPCH	R99	F	TEI	3.6.0	3.7.0
2	25.211	098	-	R1-01-0457	Downlink Phase Reference for DL-DPCCH for CPCH	REL-4	А	TEI4	4.0.0	4.1.0
3	25.211	099	-	R1-01-0460	Removal of out-of-date reference to FACH beamforming	R99	F	TEI	3.6.0	3.7.0
4	25.211	100	-	R1-01-0460	Removal of out-of-date reference to FACH beamforming	REL-4	Α	TEI4	4.0.0	4.1.0
5	25.211	101	-	R1-01-0466	Correction of compressed mode by puncturing	R99	F	TEI	3.6.0	3.7.0
6	25.211	102	-	R1-01-0466	Correction of compressed mode by puncturing	REL-4	А	TEI4	4.0.0	4.1.0
7	25.211	103	-	R1-01-0497	Correction of the representation of slot format	R99	F	TEI	3.6.0	3.7.0
8	25.211	104	-	R1-01-0497	Correction of the representation of slot format	REL-4	Α	TEI4	4.0.0	4.1.0
9	25.211	105	1	R1-01-0613	Clarification of PDSCH definition	R99	F	TEI	3.6.0	3.7.0
10	25.211	106	1	R1-01-0613	Clarification of PDSCH definition	REL-4	A	TEI4	4.0.0	4.1.0

		CHAN	GE REC	QUES	Г	Cr	≺-⊢orm-v4
ж	<mark>25.211</mark>	CR 097	۲ev R	<b>-</b> #	Current vers	<sup>ion:</sup> 3.6.0 <sup>\$</sup>	£
For <u>HELP</u> on us	sing this fo	rm, see bottom o	of this page o	r look at tl	he pop-up text	over the X symb	ols.
Proposed change a	affects:	(U)SIM	ME/UE X	Radio A	ccess Network	<b>X</b> Core Netw	vork
Title: #	Downlink	Phase Referen	ce for DL-DP	CCH for C	PCH		
Source: #	TSG RAN	NWG1					
Work item code: #	TEI				Date: ೫	15.5.2001	
Category: Ж	F Use <u>one</u> of F (cor A (cor B (add C (fur D (edi Detailed ex be found in	the following cate rection) responds to a cor dition of feature), actional modification torial modification planations of the a 3GPP <u>TR 21.900</u>	gories: rection in an e on of feature) ) above categori	arlier releas es can	Release: % Use <u>one</u> of 2 se) R96 R97 R98 R99 REL-4 REL-5	R99 the following releas (GSM Phase 2) (Release 1996) (Release 1997) (Release 1998) (Release 1999) (Release 4) (Release 5)	ses:
Reason for change	: ೫ What beer what	t phase reference clearly defined t to support with	ces are applic in the 25.21 DL-DPCCH	caple for th 1, thus it is for CPCH.	ne DL-DPCCH s not clear for	with CPCH has u	not on
Summary of chang	e: # - The phase	e DL-DPCCH fo se reference	r CPCH is sta	ated to use	e always the pr	imary CPICH as	the
Consequences if not approved:	業 The refei	UE may be impl ence possibilitie	lemented diff es with DL-DF	erently de CCH for (	pending on ver CPCH are not	ndor since the ph specified.	ase
Clauses affected:	ж						
Other specs affected:	ж — О Т О	ther core specifi est specification &M Specification	ications s ns	Ħ			
Other comments:	ж						

### How to create CRs using this form:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 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.

# 5.3.3 Common downlink physical channels

### 5.3.3.1 Common Pilot Channel (CPICH)

The CPICH is a fixed rate (30 kbps, SF=256) downlink physical channel that carries a pre-defined bit/symbol sequence. Figure 13 shows the frame structure of the CPICH.



Figure 13: Frame structure for Common Pilot Channel

In case transmit diversity (open or closed loop) is used on any downlink channel in the cell, the CPICH shall be transmitted from both antennas using the same channelization and scrambling code. In this case, the pre-defined symbol sequence of the CPICH is different for Antenna 1 and Antenna 2, see figure 14. In case of no transmit diversity, the symbol sequence of Antenna 1 in figure 14 is used.



Figure 14: Modulation pattern for Common Pilot Channel (with A = 1+j)

There are two types of Common pilot channels, the Primary and Secondary CPICH. They differ in their use and the limitations placed on their physical features.

### 5.3.3.1.1 Primary Common Pilot Channel (P-CPICH)

The Primary Common Pilot Channel (P-CPICH) has the following characteristics:

- The same channelization code is always used for the P-CPICH, see [4];
- The P-CPICH is scrambled by the primary scrambling code, see [4];
- There is one and only one P-CPICH per cell;
- The P- CPICH is broadcast over the entire cell.

The Primary CPICH is a phase reference for the following downlink channels: SCH, Primary CCPCH, AICH, PICH AP-AICH, CD/CA-ICH, CSICH, <u>DL-DPCCH for CPCH</u> and the S-CCPCH. By default, the Primary CPICH is also a phase reference for downlink DPCH. The UE is informed by higher layer signalling if the P-CPICH is not a phase reference for a downlink DPCH.

The Primary CPICH is always a phase reference for a downlink physical channel using closed loop TX diversity.

A Secondary Common Pilot Channel (S-CPICH) has the following characteristics:

- An arbitrary channelization code of SF=256 is used for the S-CPICH, see [4];
- A S-CPICH is scrambled by either the primary or a secondary scrambling code, see [4];
- There may be zero, one, or several S-CPICH per cell;
- A S-CPICH may be transmitted over the entire cell or only over a part of the cell;

A Secondary CPICH may be a phase reference for a downlink DPCH. If this is the case, the UE is informed about this by higher-layer signalling.

The Secondary CPICH can be a phase reference for a downlink physical channel using open loop TX diversity, instead of the Primary CPICH being a phase reference.

Note that it is possible that neither the P-CPICH nor any S-CPICH is a phase reference for a downlink DPCH.

### 5.3.3.2 Downlink phase reference

Table 16 summarizes the possible phase references usable on different downlink physical channel types.

# Table 16: Application of phase references on downlink physical channel types "X" – can be applied, "–" – not applied

Physical channel type	Primary-CPICH	Secondary-CPICH	Dedicated pilot
P-CCPCH	Х	_	_
SCH	Х	-	_
S-CCPCH	Х	-	-
DPCH	Х	Х	Х
PICH	Х	-	-
PDSCH*	Х	Х	Х
AICH	Х	-	_
CSICH	Х	-	Ι
DL-DPCCH for CPCH	X	=	Ш

Note \* The same phase reference as with the associated DPCH shall be used.

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CHANGE REQUEST									
ж	25.211	CR <mark>098</mark>	ж	rev 🗧	ж	Current vers	<sup>ion:</sup> <b>4.0.(</b>	) <sup>ж</sup>	
For <u>HELP</u> on us	sing this for	m, see bottom	of this pag	e or look	at the	e pop-up text	over the # s	ymbols.	
Proposed change a	affects:	(U)SIM	ME/UE	X Rac	lio Aco	cess Network	Core I	Network	
Title: ೫	Downlink	Phase Referen	ce for DL-	DPCCH f	or CP	CH			
Source: ೫	TSG RAN	IWG1							
Work item code: ೫	TEI4					Date: ೫	15.5.2001		
Category: Ж	A Use <u>one</u> of F (con A (cor B (add C (fun D (edi Detailed exp be found in	the following cate rection) responds to a col lition of feature), ctional modification torial modification blanations of the 3GPP <u>TR 21.900</u>	egories: rrection in a on of featur n) above cate	nn earlier r e) gories can	elease	Release: # Use <u>one</u> of 2 () R96 R97 R98 R99 REL-4 REL-5	REL-4 the following r (GSM Phase 1990 (Release 1991 (Release 1993 (Release 1995 (Release 4) (Release 4) (Release 5)	əleases: 2) 3) 7) 3) 9)	
Reason for change	: ೫ What beer what	t phase referen clearly defined to support with	ces are ap l in the 25. DL-DPC(	plicaple f 211 , thu CH for CP	or the s it is CH.	DL-DPCCH	with CPCH I	has not	
Summary of chang	e: # - The phase	DL-DPCCH fo e reference	r CPCH is	stated to	use a	always the pr	imary CPICH	l as the	
Consequences if not approved:	業 The refer	UE may be imp ence possibilitie	lemented es with DL	differently -DPCCH	/ depe for Cl	ending on ver PCH are not	ndor since the specified.	e phase	
Clauses affected:	ж								
Other specs affected:	ж — О Те О	ther core specif est specification &M Specificatio	ications s ns	ж					
Other comments:	ж								

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The Primary CPICH is always a phase reference for a downlink physical channel using closed loop TX diversity.

### 5.3.3.1.2 Secondary Common Pilot Channel (S-CPICH)

A Secondary Common Pilot Channel (S-CPICH) has the following characteristics:

- An arbitrary channelization code of SF=256 is used for the S-CPICH, see [4];
- A S-CPICH is scrambled by either the primary or a secondary scrambling code, see [4];
- There may be zero, one, or several S-CPICH per cell;
- A S-CPICH may be transmitted over the entire cell or only over a part of the cell;

A Secondary CPICH may be a phase reference for a downlink DPCH. If this is the case, the UE is informed about this by higher-layer signalling.

The Secondary CPICH can be a phase reference for a downlink physical channel using open loop TX diversity, instead of the Primary CPICH being a phase reference.

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SCH	Х	-	-
S-CCPCH	Х	-	-
DPCH	Х	Х	Х
PICH	Х	-	-
PDSCH*	Х	Х	Х
AICH	Х	—	—
CSICH	X	-	_
DL-DPCCH for CPCH	<u>X</u>	Ξ	=

Note \* The same phase reference as with the associated DPCH shall be used.

R1-01-0460

# 3GPP TSG RAN Meeting #12 Stockholm, Sweden, 12-15, June, 2001

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Proposed change	affec	ts:	(U)S	SIM	ME/l	JE	Rac	dio Ac	ccess	Networ	k X	Core	e Ne	twork
Title: #	Rei	noval	<mark>of out-</mark>	of-date r	eferenc	ce to F	ACH b	<mark>beam</mark>	formin	g				
Source: #	S TS	<mark>G RAN</mark>	WG1											
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Summary of chang	<b>ge:</b> Ж	The	statemo	ent that	S-CCP	<mark>CH ma</mark>	<mark>ay be t</mark>	ransr	nitted	<mark>in a na</mark>	arrow	<mark>lobe is</mark>	rem	noved.
Consequences if not approved:	ж	Inco	nsisten	cy wheth	her S-C	CPCH	l appli	es be	eamfor	ming o	r not			
Clauses affected:	ж	5.3.3	3.4											
Other specs affected:	ж	01 Te	ther co est spe &M Spe	re specif cificatior ecificatio	fications ns ons	S	ж							
Other comments:	ж													

### How to create CRs using this form:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
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### 5.3.3.4 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 for the Secondary CCPCH is the same as for the downlink DPCH, see subclause 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 17. The channel bit and symbol rates given in table 17 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 transport channel mapped to the Primary CCPCH (BCH) can only have a fixed predefined transport format combination, while the Secondary CCPCH support multiple transport format combinations using TFCI. Furthermore, a Primary CCPCH is transmitted over the entire cell while a Secondary-CCPCH 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).

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

### Table 17: Secondary CCPCH fields

\* 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.)

# 3GPP TSG RAN Meeting #12 Stockholm, Sweden, 12-15, June, 2001

#### CR-Form-v4 CHANGE REQUEST ж 25.211 CR 100 ₩ rev ж Current version: ж 4.0.0 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 Radio Access Network X Core Network Title: æ Removal of out-of-date reference to FACH beamforming Source: TSG RAN WG1 æ Date: # 15.05.2001 Work item code: # TEI4 Category: Ж Α Release: # REL-4 Use one of the following categories: Use one of the following releases: F (correction) 2 (GSM Phase 2) A (corresponds to a correction in an earlier release) R96 (Release 1996) B (addition of feature), R97 (Release 1997) **C** (functional modification of feature) R98 (Release 1998) **D** (editorial modification) R99 (Release 1999) Detailed explanations of the above categories can (Release 4) REL-4 be found in 3GPP TR 21.900. (Release 5) REL-5 In TSG-RAN #11 meeting a CR for removing S-CPICH as a phase reference for Reason for change: # S-CCPCH was approved. Since S-CCPCH is thus effectively not beamformed, a reference to this feature is removed in TS25.211 The statement that S-CCPCH may be transmitted in a narrow lobe is removed. Summary of change: # Consequences if ж Inconsistency whether S-CCPCH applies beamforming or not not approved: Clauses affected: ж 5.3.3.4 Other specs ж Other core specifications Ж affected: Test specifications **O&M** Specifications Other comments: ж

### How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: <u>http://www.3gpp.org/3G\_Specs/CRs.htm</u>. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
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R1-01-0460

### 5.3.3.4 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 for the Secondary CCPCH is the same as for the downlink DPCH, see subclause 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 17. The channel bit and symbol rates given in table 17 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 transport channel mapped to the Primary CCPCH (BCH) can only have a fixed predefined transport format combination, while the Secondary CCPCH support multiple transport format combinations using TFCI. Furthermore, a Primary CCPCH is transmitted over the entire cell while a Secondary-CCPCH 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).

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2	30	15	256	300	20	18	0	2
3	30	15	256	300	20	10	8	2
4	60	30	128	600	40	40	0	0
5	60	30	128	600	40	32	8	0
6	60	30	128	600	40	38	0	2
7	60	30	128	600	40	30	8	2
8	120	60	64	1200	80	72	0	8*
9	120	60	64	1200	80	64	8	8*
10	240	120	32	2400	160	152	0	8*
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13	480	240	16	4800	320	296	16	8*
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	CHANGE REQUEST
ж	<b>25.211</b> CR <b>101 #</b> rev <b>_ #</b> Current version: <b>3.6.0 #</b>
For <u>HELP</u> on us	ing this form, see bottom of this page or look at the pop-up text over the $#$ symbols.
Proposed change a	ffects: # (U)SIM ME/UE X Radio Access Network X Core Network
Title: ೫	Correction of compressed mode by puncturing
Source: ೫	TSG RAN WG1
Work item code: %	TEI Date: # May 15, 2001
Category: ⊮	FRelease: %R99Use one of the following categories:Use one of the following releases:F (correction)2A (corresponds to a correction in an earlier release)R96B (addition of feature),R97C (functional modification of feature)R98D (editorial modification)R99Detailed explanations of the above categories canREL-4De found in 3GPP TR 21.900.REL-5
Reason for change:	# Correction is necessary to avoid ambiguity
Summary of change	Clarification what slot format that shall be used for each compressed mode method
Consequences if not approved:	# Ambiguity in specification on what slot format to use in compressed frames
Clauses affected:	¥ 5.3.2
Other specs affected:	%       Other core specifications       %         Test specifications       %         O&M Specifications       %
Other comments:	¥

### How to create CRs using this form:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 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.

# 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 subclause 5.2.1.

Figure 9 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.



One radio frame,  $T_f = 10 \text{ ms}$ 



The parameter k in figure 9 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 given in table 11. What slot format to use is configured by higher layers and can also be reconfigured by higher layers.

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. It is the UTRAN that determines if a TFCI should be transmitted and it is mandatory for all UEs to support the use of TFCI in the downlink. The mapping of TFCI bits onto slots is described in [3].

In compressed <u>frames mode</u>, a different slot format is used compared to normal mode. There are two possible compressed slot formats that are labelled A and B. <u>Slot Ff</u>ormat B <u>shall be is</u> used <u>in frames for</u> compressed <u>mode</u> by spreading factor reduction and <u>slot</u> format A <u>shall be is</u>-used <u>in frames compressed by puncturing or higher layer</u> <u>scheduling for all other transmission time reduction methods</u>. The channel bit and symbol rates given in table 11 are the rates immediately before spreading.

Slot	Channel	Channel	SF	Bits/	DPI	CH	DPCCH Bits/Slot			Transmitted
Format #i	Bit Rate (kbps)	Symbol Rate		Slot	Bits	/Slot	Bits/Slot			slots per
<i><b>π</b></i>	(KDP3)	(ksps)			Novi	Naka	Ness	Nero	Neur	N <sub>Tr</sub>
					∎∎Data1	INData2	NIPC	NIFCI	Pilot	
0	15	7.5	512	10	0	4	2	0	4	15
0A	15	7.5	512	10	0	4	2	0	4	8-14
0B	30	15	256	20	0	8	4	0	8	8-14
1	15	7.5	512	10	0	2	2	2	4	15
1B	30	15	256	20	0	4	4	4	8	8-14
2	30	15	256	20	2	14	2	0	2	15
2A	30	15	256	20	2	14	2	0	2	8-14
2B	60	30	128	40	4	28	4	0	4	8-14
3	30	15	256	20	2	12	2	2	2	15
3A	30	15	256	20	2	10	2	4	2	8-14
3B	60	30	128	40	4	24	4	4	4	8-14
4	30	15	256	20	2	12	2	0	4	15
4A	30	15	256	20	2	12	2	0	4	8-14
4B	60	30	128	40	4	24	4	0	8	8-14
5	30	15	256	20	2	10	2	2	4	15
5A	30	15	256	20	2	8	2	4	4	8-14
5B	60	30	128	40	4	20	4	4	8	8-14
6	30	15	256	20	2	8	2	0	8	15
6A	30	15	256	20	2	8	2	0	8	8-14
6B	60	30	128	40	4	16	4	0	16	8-14
7	30	15	256	20	2	6	2	2	8	15
7A	30	15	256	20	2	4	2	4	8	8-14
7B	60	30	128	40	4	12	4	4	16	8-14
8	60	30	128	40	6	28	2	0	4	15
8A	60	30	128	40	6	28	2	0	4	8-14
8B	120	60	64	80	12	56	4	0	8	8-14
9	60	30	128	40	6	26	2	2	4	15
9A	60	30	128	40	6	24	2	4	4	8-14
9B	120	60	64	80	12	52	4	4	8	8-14
10	60	30	128	40	6	24	2	0	8	15
10A	60	30	128	40	6	24	2	0	8	8-14
10B	120	60	64	80	12	48	4	0	16	8-14
11	60	30	128	40	6	22	2	2	8	15
11A	60	30	128	40	6	20	2	4	8	8-14
11B	120	60	64	80	12	44	4	4	16	8-14
12	120	60	64	80	12	48	4	8*	8	15
12A	120	60	64	80	12	40	4	16*	8	8-14
12B	240	120	32	160	24	96	8	16*	16	8-14
13	240	120	32	160	28	112	4	8*	8	15
13A	240	120	32	160	28	104	4	16*	8	8-14
13B	480	240	16	320	56	224	8	16*	16	8-14
14	480	240	16	320	56	232	8	8*	16	15
14A	480	240	16	320	56	224	8	16*	16	8-14
14B	960	480	8	640	112	464	16	16*	32	8-14
15	960	480	8	640	120	488	8	8*	16	15
15A	960	480	8	640	120	480	8	16*	16	8-14
15B	1920	960	4	1280	240	976	16	16*	32	8-14
16	1920	960	4	1280	248	1000	8	8*	16	15
16A	1920	960	4	1280	248	992	8	16*	16	8-14

### Table 11: DPDCH and DPCCH fields

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

NOTE1: Compressed mode is only supported through spreading factor reduction for SF=512 with TFCI.

NOTE2: Compressed mode by spreading factor reduction is not supported for SF=4.

NOTE3: If the Node B receives an invalid combination of data frames for downlink transmission, the procedure specified in [15], sub-clause 5.1.2, may require the use of DTX in both the DPDCH and the TFCI field of the DPCCH.

The pilot bit patterns are described in table 12. The shadowed column part of pilot bit pattern is defined as FSW and FSWs can be used to confirm frame synchronization. (The value of the pilot bit pattern other than FSWs shall be "11".) In table 12, the transmission order is from left to right.

In downlink compressed mode through spreading factor reduction, the number of bits in the TPC and Pilot fields are doubled. Symbol repetition is used to fill up the fields. Denote the bits in one of these fields in normal mode by  $x_1, x_2, x_3, ..., x_X$ . In compressed mode the following bit sequence is sent in corresponding field:  $x_1, x_2, x_1, x_2, x_3, x_4, x_3, x_4, ..., x_X$ .

-	r			·											
	N <sub>pilot</sub>	N <sub>pilo</sub>	<sub>ot</sub> = 4		N <sub>pilo</sub>	I <sub>pilot</sub> = 8 N <sub>pilot</sub> = 16									
	= 2	(*	1)	(*2)				(*3)							
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

Table 12: Pilot bit patterns for downlink DPCCH with  $N_{pilot} = 2, 4, 8$  and 16

NOTE \*1: This pattern is used except slot formats 2B and 3B.

NOTE \*2: This pattern is used except slot formats 0B, 1B, 4B, 5B, 8B, and 9B.

NOTE \*3: This pattern is used except slot formats 6B, 7B, 10B, 11B, 12B, and 13B.

NOTE: For slot format *n*B where n = 0, ..., 15, the pilot bit pattern corresponding to  $N_{pilot}/2$  is to be used and symbol repetition shall be applied.

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

	TPC Bit Pattern		Transmitter power
$N_{TPC} = 2$	$N_{TPC} = 4$	N <sub>TPC</sub> = 8	control command
11	1111	11111111	1
00	0000	0000000	0

#### Table 13: TPC Bit Pattern

Multicode transmission may be employed in the downlink, i.e. the CCTrCH (see [3]) is mapped onto several parallel downlink DPCHs using the same spreading factor. In this case, the Layer 1 control information is transmitted only on the first downlink DPCH. DTX bits are transmitted during the corresponding time period for the additional downlink DPCHs, see figure 10.

In case there are several CCTrCHs mapped to different DPCHs transmitted to the same UE different spreading factors can be used on DPCHs to which different CCTrCHs are mapped. Also in this case, Layer 1 control information is only transmitted on the first DPCH while DTX bits are transmitted during the corresponding time period for the additional DPCHs.



Figure 10: Downlink slot format in case of multi-code transmission

	CHANGE REQUEST								
ж	25.211 CR 102 * rev _ * Current version: 4.0.0 *								
For <u>HELP</u> on usi	ng this form, see bottom of this page or look at the pop-up text over the $#$ symbols.								
Proposed change af	Proposed change affects: # (U)SIM ME/UE X Radio Access Network X Core Network								
Title: ж	Correction of compressed mode by puncturing								
Source: ೫	TSG RAN WG1								
Work item code: 🕷 📒	TEI4 Date: # May 15, 2001								
Category: ೫	ARelease: %REL-4ise one of the following categories:Use one of the following releases:F (correction)2A (corresponds to a correction in an earlier release)R96B (addition of feature),R97C (functional modification of feature)R98D (editorial modification)R99e found in 3GPP TR 21.900.REL-5								
Reason for change:	Correction is necessary to avoid ambiguity								
Summary of change	Clarification what slot format that shall be used for each compressed mode method								
Consequences if not approved:	# Ambiguity in specification on what slot format to use in compressed frames								
Clauses affected:	¥ 5.3.2								
Other specs affected:	%       Other core specifications       %         Test specifications       %         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

# 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 subclause 5.2.1.

Figure 9 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.



One radio frame,  $T_f = 10 \text{ ms}$ 



The parameter k in figure 9 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 given in table 11. What slot format to use is configured by higher layers and can also be reconfigured by higher layers.

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. It is the UTRAN that determines if a TFCI should be transmitted and it is mandatory for all UEs to support the use of TFCI in the downlink. The mapping of TFCI bits onto slots is described in [3].

In compressed <u>frames mode</u>, a different slot format is used compared to normal mode. There are two possible compressed slot formats that are labelled A and B. <u>Slot f</u>Format B <u>shall be is</u> used <u>in frames for</u> compressed <u>mode</u> by spreading factor reduction and <u>slot</u> format A <u>shall be is</u>-used <u>in frames compressed by puncturing or higher layer</u> <u>scheduling for all other transmission time reduction methods</u>. The channel bit and symbol rates given in table 11 are the rates immediately before spreading.

Slot	Channel	Channel	SF	Bits/	DPI	CH	DPCCH		Transmitted	
Format #i	Bit Rate (kbps)	Symbol Rate		Slot	Bits	/Slot	Bits/Slot			slots per
<i><b>π</b></i>	(KDP3)	(ksps)			Novi	Naka	Ness	N-rot Nov.		N <sub>Tr</sub>
					∎∎Data1	INData2	NIPC	NIFCI	Pilot	
0	15	7.5	512	10	0	4	2	0	4	15
0A	15	7.5	512	10	0	4	2	0	4	8-14
0B	30	15	256	20	0	8	4	0	8	8-14
1	15	7.5	512	10	0	2	2	2	4	15
1B	30	15	256	20	0	4	4	4	8	8-14
2	30	15	256	20	2	14	2	0	2	15
2A	30	15	256	20	2	14	2	0	2	8-14
2B	60	30	128	40	4	28	4	0	4	8-14
3	30	15	256	20	2	12	2	2	2	15
3A	30	15	256	20	2	10	2	4	2	8-14
3B	60	30	128	40	4	24	4	4	4	8-14
4	30	15	256	20	2	12	2	0	4	15
4A	30	15	256	20	2	12	2	0	4	8-14
4B	60	30	128	40	4	24	4	0	8	8-14
5	30	15	256	20	2	10	2	2	4	15
5A	30	15	256	20	2	8	2	4	4	8-14
5B	60	30	128	40	4	20	4	4	8	8-14
6	30	15	256	20	2	8	2	0	8	15
6A	30	15	256	20	2	8	2	0	8	8-14
6B	60	30	128	40	4	16	4	0	16	8-14
7	30	15	256	20	2	6	2	2	8	15
7A	30	15	256	20	2	4	2	4	8	8-14
7B	60	30	128	40	4	12	4	4	16	8-14
8	60	30	128	40	6	28	2	0	4	15
8A	60	30	128	40	6	28	2	0	4	8-14
8B	120	60	64	80	12	56	4	0	8	8-14
9	60	30	128	40	6	26	2	2	4	15
9A	60	30	128	40	6	24	2	4	4	8-14
9B	120	60	64	80	12	52	4	4	8	8-14
10	60	30	128	40	6	24	2	0	8	15
10A	60	30	128	40	6	24	2	0	8	8-14
10B	120	60	64	80	12	48	4	0	16	8-14
11	60	30	128	40	6	22	2	2	8	15
11A	60	30	128	40	6	20	2	4	8	8-14
11B	120	60	64	80	12	44	4	4	16	8-14
12	120	60	64	80	12	48	4	8*	8	15
12A	120	60	64	80	12	40	4	16*	8	8-14
12B	240	120	32	160	24	96	8	16*	16	8-14
13	240	120	32	160	28	112	4	8*	8	15
13A	240	120	32	160	28	104	4	16*	8	8-14
13B	480	240	16	320	56	224	8	16*	16	8-14
14	480	240	16	320	56	232	8	8*	16	15
14A	480	240	16	320	56	224	8	16*	16	8-14
14B	960	480	8	640	112	464	16	16*	32	8-14
15	960	480	8	640	120	488	8	8*	16	15
15A	960	480	8	640	120	480	8	16*	16	8-14
15B	1920	960	4	1280	240	976	16	16*	32	8-14
16	1920	960	4	1280	248	1000	8	8*	16	15
16A	1920	960	4	1280	248	992	8	16*	16	8-14

### Table 11: DPDCH and DPCCH fields

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

NOTE1: Compressed mode is only supported through spreading factor reduction for SF=512 with TFCI.

NOTE2: Compressed mode by spreading factor reduction is not supported for SF=4.

NOTE3: If the Node B receives an invalid combination of data frames for downlink transmission, the procedure specified in [15], sub-clause 5.1.2, may require the use of DTX in both the DPDCH and the TFCI field of the DPCCH.

The pilot bit patterns are described in table 12. The shadowed column part of pilot bit pattern is defined as FSW and FSWs can be used to confirm frame synchronization. (The value of the pilot bit pattern other than FSWs shall be "11".) In table 12, the transmission order is from left to right.

In downlink compressed mode through spreading factor reduction, the number of bits in the TPC and Pilot fields are doubled. Symbol repetition is used to fill up the fields. Denote the bits in one of these fields in normal mode by  $x_1, x_2, x_3, ..., x_X$ . In compressed mode the following bit sequence is sent in corresponding field:  $x_1, x_2, x_1, x_2, x_3, x_4, x_3, x_4, ..., x_X$ .

-	r			·											
	N <sub>pilot</sub>	N <sub>pilo</sub>	<sub>ot</sub> = 4		N <sub>pilo</sub>	<sub>ot</sub> = 8					N <sub>pilot</sub>	= 16			
	= 2	(*	1)		(*	2)					(*	3)			
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

Table 12: Pilot bit patterns for downlink DPCCH with  $N_{pilot} = 2, 4, 8$  and 16

NOTE \*1: This pattern is used except slot formats 2B and 3B.

NOTE \*2: This pattern is used except slot formats 0B, 1B, 4B, 5B, 8B, and 9B.

NOTE \*3: This pattern is used except slot formats 6B, 7B, 10B, 11B, 12B, and 13B.

NOTE: For slot format *n*B where n = 0, ..., 15, the pilot bit pattern corresponding to  $N_{pilot}/2$  is to be used and symbol repetition shall be applied.

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

Transmitter power		TPC Bit Pattern	
control command	N <sub>TPC</sub> = 8	$N_{TPC} = 4$	$N_{TPC} = 2$
1	11111111	1111	11
0	0000000	0000	00

### Table 13: TPC Bit Pattern

Multicode transmission may be employed in the downlink, i.e. the CCTrCH (see [3]) is mapped onto several parallel downlink DPCHs using the same spreading factor. In this case, the Layer 1 control information is transmitted only on the first downlink DPCH. DTX bits are transmitted during the corresponding time period for the additional downlink DPCHs, see figure 10.

In case there are several CCTrCHs mapped to different DPCHs transmitted to the same UE different spreading factors can be used on DPCHs to which different CCTrCHs are mapped. Also in this case, Layer 1 control information is only transmitted on the first DPCH while DTX bits are transmitted during the corresponding time period for the additional DPCHs.



Figure 10: Downlink slot format in case of multi-code transmission

		CHAN	IGE RE	QUES	ST		CR-Form-v4	
ж	25.211	CR 103	ж re	v _ 9	Current ver	sion: 3.6.0	ж	
For <u>HELP</u> on t	using this for	rm, see bottom	of this page	or look at	the pop-up tex	t over the X sy	mbols.	
Proposed change affects: # (U)SIM ME/UE X Radio Access Network X Core Network								
Title: #	Correction	n of the represe	entation of sl	ot format				
Source: ೫	S TSG RAN	WG1						
Work item code: #	6 TEI				Date: ೫	€ <mark>18, May, 200</mark>	01	
Category: ≇	<b>F</b> Use <u>one</u> of <i>F</i> (co <i>A</i> (cc release <i>B</i> (ac <i>C</i> (fut <i>D</i> (cc Detailed exp be found in	the following cate rrection) presponds to a ca dition of feature) nctional modification planations of the 3GPP <u>TR 21.900</u>	egories: orrection in ar , tion of feature on) above catego <u>2</u> .	earlier ) ries can	Release: # Use one o 2 R96 R97 R98 R99 REL-4 REL-5	f the following rel (GSM Phase 2) (Release 1996) (Release 1997) (Release 1998) (Release 1999) (Release 4) (Release 5)	eases:	
Reason for chang	e: # The CCP	reference symb CH and PDSC	ool from TS2 H	5.212 doe	es not cover the	e case of P-CCF	PCH, S-	
Summary of chan	ge: ೫ The N <sub>data</sub>	number of data 2.	bits per dov	nlink slot	is always repre	esented by N <sub>data</sub>	and	
Consequences if not approved:	# Inco CCP	nsistency of the CH, S-CCPCH	and PDSCH	lata bits p I.	per downlink slo	ot happens in ca	ase of P-	
Clauses affected:	ж <mark>3, 5.</mark>	3.3.3, 5.3.3.6,						
Other specs affected:	ж С Т С	other core speci est specification &M Specification	ifications ns ons	ж				
Other comments:	ж							

### How to create CRs using this form:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 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.

# 3 <u>Symbols and a</u>Abbreviations

# 3.1 Symbols

 $N_{data1}$ The number of data bits per downlink slot in Data1 field. $N_{data2}$ The number of data bits per downlink slot in Data2 field. If the slot format does not contain aData2 field,  $N_{data2} = 0$ .

# 3.2 Abbreviations

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

AI	Acquisition Indicator
AICH	Acquisition Indicator Channel
AP	Access Preamble
AP-AICH	Access Preamble Acquisition Indicator Channel
API	Access Preamble Indicator
BCH	Broadcast Channel
CA	Channel Assignment
CAI	Channel Assignment Indicator
CCC	CPCH Control Command
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CD	Collision Detection
CD/CA-ICH	Collision Detection/Channel Assignment Indicator Channel
CDI	Collision Detection Indicator
CPCH	Common Packet Channel
CPICH	Common Pilot Channel
CSICH	CPCH Status Indicator Channel
DCH	Dedicated Channel
DPCCH	Dedicated Physical Control Channel
DPCH	Dedicated Physical Channel
DPDCH	Dedicated Physical Data Channel
DSCH	Downlink Shared Channel
DSMA-CD	Digital Sense Multiple Access - Collison Detection
DTX	Discontinuous Transmission
FACH	Forward Access Channel
FBI	Feedback Information
FSW	Frame Synchronization Word
ICH	Indicator Channel
MUI	Mobile User Identifier
PCH	Paging Channel
P-CCPCH	Primary Common Control Physical Channel
PCPCH	Physical Common Packet Channel
PDSCH	Physical Downlink Shared Channel
PICH	Page Indicator 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
SI	Status Indicator
SSC	Secondary Synchronisation Code
STTD	Space Time Transmit Diversity

3

TFCI	Transport Format Combination Indicator
TSTD	Time Switched Transmit Diversity
TPC	Transmit Power Control
UE	User Equipment
UTRAN	UMTS Terrestrial Radio Access Network

### 5.3.3.3 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 transport channel.

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 subclause 5.3.3.4).



### Figure 15: Frame structure for Primary Common Control Physical Channel

### 5.3.3.4 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 for the Secondary CCPCH is the same as for the downlink DPCH, see subclause 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 17. The channel bit and symbol rates given in table 17 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 transport channel mapped to the Primary CCPCH (BCH) can only have a fixed predefined transport format combination, while the Secondary CCPCH support multiple transport format combinations using TFCI. Furthermore, a Primary CCPCH is transmitted over the entire cell while a Secondary CCPCH 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).

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N <sub>data1</sub>	N <sub>pilot</sub>	NTFCI
0	30	15	256	300	20	20	0	0
1	30	15	256	300	20	12	8	0
2	30	15	256	300	20	18	0	2
3	30	15	256	300	20	10	8	2
4	60	30	128	600	40	40	0	0
5	60	30	128	600	40	32	8	0
6	60	30	128	600	40	38	0	2
7	60	30	128	600	40	30	8	2
8	120	60	64	1200	80	72	0	8*
9	120	60	64	1200	80	64	8	8*
10	240	120	32	2400	160	152	0	8*
11	240	120	32	2400	160	144	8	8*
12	480	240	16	4800	320	312	0	8*
13	480	240	16	4800	320	296	16	8*
14	960	480	8	9600	640	632	0	8*
15	960	480	8	9600	640	616	16	8*
16	1920	960	4	19200	1280	1272	0	8*
17	1920	960	4	19200	1280	1256	16	8*

### Table 17: Secondary CCPCH fields

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\* 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.)

		Npilo	t = 8		Npilot = 16							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7
Slot #0	11	11	11	10	11	11	11	10	11	11	11	10
1	11	00	11	10	11	00	11	10	11	11	11	00
2	11	01	11	01	11	01	11	01	11	10	11	00
3	11	00	11	00	11	00	11	00	11	01	11	10
4	11	10	11	01	11	10	11	01	11	11	11	11
5	11	11	11	10	11	11	11	10	11	01	11	01
6	11	11	11	00	11	11	11	00	11	10	11	11
7	11	10	11	00	11	10	11	00	11	10	11	00
8	11	01	11	10	11	01	11	10	11	00	11	11
9	11	11	11	11	11	11	11	11	11	00	11	11
10	11	01	11	01	11	01	11	01	11	11	11	10
11	11	10	11	11	11	10	11	11	11	00	11	10
12	11	10	11	00	11	10	11	00	11	01	11	01
13	11	00	11	11	11	00	11	11	11	00	11	00
14	11	00	11	11	11	00	11	11	11	10	11	01

### Table 18: Pilot Symbol Pattern

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain transport format combination of the FACHs and/or PCHs currently in use. This correspondence is (re-)negotiated at each FACH/PCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

### 5.3.3.6 Physical Downlink Shared Channel (PDSCH)

The Physical Downlink Shared Channel (PDSCH) is used to carry the Downlink Shared Channel (DSCH).

A PDSCH corresponds to a channelisation code below or at a PDSCH root channelisation code. A PDSCH is allocated on a radio frame basis to a single UE. Within one radio frame, UTRAN may allocate different PDSCHs under the same PDSCH root channelisation code to different UEs based on code multiplexing. Within the same radio frame, multiple parallel PDSCHs, with the same spreading factor, may be allocated to a single UE. This is a special case of multicode

transmission. All the PDSCHs under the same PDSCH root channelisation code are operated with radio frame synchronisation.

PDSCHs allocated to the same UE on different radio frames may have different spreading factors.

The frame and slot structure of the PDSCH are shown on figure 20.



#### Figure 20: Frame structure for the PDSCH

For each radio frame, each PDSCH is associated with one downlink DPCH. The PDSCH and associated DPCH do not necessarily have the same spreading factors and are not necessarily frame aligned.

All relevant Layer 1 control information is transmitted on the DPCCH part of the associated DPCH, i.e. the PDSCH does not carry Layer 1 information. To indicate for UE that there is data to decode on the DSCH, the TFCI field of the associated DPCH shall be used.

The TFCI informs the UE of the instantaneous transport format parameters related to the PDSCH as well as the channelisation code of the PDSCH.

The channel bit rates and symbol rates for PDSCH are given in table 20.

For PDSCH the allowed spreading factors may vary from 256 to 4.

#### Table 20: PDSCH fields

Slot format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	Ndata <u>1</u>
0	30	15	256	300	20	20
1	60	30	128	600	40	40
2	120	60	64	1200	80	80
3	240	120	32	2400	160	160
4	480	240	16	4800	320	320
5	960	480	8	9600	640	640
6	1920	960	4	19200	1280	1280

When open loop transmit diversity is employed for the PDSCH, STTD encoding is used on the data bits as described in subclause 5.3.1.1.1.

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#### 1

### 3GPP TSG RAN Meeting #12 Stockholm, Sweden, 12-15, June, 2001

# R1-01-0497

ж	25.211	CR <mark>104</mark>	¥ rev	/ _ ¥	Current vers	ion: <b>3.6.0</b> <sup>#</sup>		
For <u>HELP</u> on t	using this for	m, see bottom	of this page o	or look at	the pop-up text	over the		
Proposed change affects: # (U)SIM ME/UE X Radio Access Network Core Network								
Title: ೫	Correction	n of the represe	entation of slo	t format				
Source: ೫	S TSG RAN	I WG1						
Work item code: #	TEI4				<i>Date:</i>	18, May, 2001		
Category: ⊮	B A Use <u>one</u> of F (co A (cc release B (ac C (ful D (cc Detailed exp be found in	the following cate rrection) rresponds to a co e) Idition of feature) nctional modification litorial modification planations of the 3GPP <u>TR 21.900</u>	egories: prrection in an , tion of feature) on) above categor ).	<i>earlier</i> ies can	Release: % Use <u>one</u> of a 2 R96 R97 R98 R99 REL-4 REL-5	REL-4 the following releases: (GSM Phase 2) (Release 1996) (Release 1997) (Release 1998) (Release 1999) (Release 4) (Release 5)		
Reason for chang	e: # The CCP	reference symb CH and PDSCI	ool from TS25	5.212 doe:	s not cover the o	case of P-CCPCH, S-		
Summary of chan	ge: ೫ The N <sub>data</sub>	number of data 2.	bits per dow	nlink slot	is always repres	sented by N <sub>data1</sub> and		
Consequences if not approved:	# Inco CCP	nsistency of the CH, S-CCPCH	number of d and PDSCH	ata bits po	er downlink slot	happens in case of P-		
Clauses affected:	Ж <mark>3, 5.</mark>	3.3.3, 5.3.3.6,						
Other specs affected:	ж С Т С	ther core speci est specification &M Specification	fications ns ons	ж				
Other comments:	ж							

### How to create CRs using this form:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://ftp.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 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.

# 3 <u>Symbols and a</u>Abbreviations

# 3.1 Symbols

 $N_{data1}$ The number of data bits per downlink slot in Data1 field. $N_{data2}$ The number of data bits per downlink slot in Data2 field. If the slot format does not contain aData2 field,  $N_{data2} = 0$ .

# 3.2 Abbreviations

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

AI	Acquisition Indicator
AICH	Acquisition Indicator Channel
AP	Access Preamble
AP-AICH	Access Preamble Acquisition Indicator Channel
API	Access Preamble Indicator
BCH	Broadcast Channel
CA	Channel Assignment
CAI	Channel Assignment Indicator
CCC	CPCH Control Command
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CD	Collision Detection
CD/CA-ICH	Collision Detection/Channel Assignment Indicator Channel
CDI	Collision Detection Indicator
CPCH	Common Packet Channel
CPICH	Common Pilot Channel
CSICH	CPCH Status Indicator Channel
DCH	Dedicated Channel
DPCCH	Dedicated Physical Control Channel
DPCH	Dedicated Physical Channel
DPDCH	Dedicated Physical Data Channel
DSCH	Downlink Shared Channel
DSMA-CD	Digital Sense Multiple Access - Collison Detection
DTX	Discontinuous Transmission
FACH	Forward Access Channel
FBI	Feedback Information
FSW	Frame Synchronization Word
ICH	Indicator Channel
MUI	Mobile User Identifier
PCH	Paging Channel
P-CCPCH	Primary Common Control Physical Channel
PCPCH	Physical Common Packet Channel
PDSCH	Physical Downlink Shared Channel
PICH	Page Indicator 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
SI	Status Indicator
SSC	Secondary Synchronisation Code
STTD	Space Time Transmit Diversity

3

TFCI	Transport Format Combination Indicator
TSTD	Time Switched Transmit Diversity
TPC	Transmit Power Control
UE	User Equipment
UTRAN	UMTS Terrestrial Radio Access Network

### 5.3.3.3 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 transport channel.

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 subclause 5.3.3.4).



### Figure 15: Frame structure for Primary Common Control Physical Channel

### 5.3.3.4 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 for the Secondary CCPCH is the same as for the downlink DPCH, see subclause 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 17. The channel bit and symbol rates given in table 17 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 transport channel mapped to the Primary CCPCH (BCH) can only have a fixed predefined transport format combination, while the Secondary CCPCH support multiple transport format combinations using TFCI. Furthermore, a Primary CCPCH is transmitted over the entire cell while a Secondary CCPCH 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).

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N <sub>data1</sub>	N <sub>pilot</sub>	NTFCI
0	30	15	256	300	20	20	0	0
1	30	15	256	300	20	12	8	0
2	30	15	256	300	20	18	0	2
3	30	15	256	300	20	10	8	2
4	60	30	128	600	40	40	0	0
5	60	30	128	128 600		32	8	0
6	60	30	128	600	40	38	0	2
7	60	30	128	600	40	30	8	2
8	120	60	64	1200	80	72	0	8*
9	120	60	64	1200	80	64	8	8*
10	240	120	32	2400	160	152	0	8*
11	240	120	32	2400	160	144	8	8*
12	480	240	16	4800	320	312	0	8*
13	480	240	16	4800	320	296	16	8*
14	960	480	8	9600	640	632	0	8*
15	960	480	8	9600	640	616	16	8*
16	1920	960	4	19200	1280	1272	0	8*
17	1920	960	4	19200	1280	1256	16	8*

### Table 17: Secondary CCPCH fields

5

\* 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.)

		Npilo	t = 8					Npilo	t <b>= 16</b>			
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7
Slot #0	11	11	11	10	11	11	11	10	11	11	11	10
1	11	00	11	10	11	00	11	10	11	11	11	00
2	11	01	11	01	11	01	11	01	11	10	11	00
3	11	00	11	00	11	00	11	00	11	01	11	10
4	11	10	11	01	11	10	11	01	11	11	11	11
5	11	11	11	10	11	11	11	10	11	01	11	01
6	11	11	11	00	11	11	11	00	11	10	11	11
7	11	10	11	00	11	10	11	00	11	10	11	00
8	11	01	11	10	11	01	11	10	11	00	11	11
9	11	11	11	11	11	11	11	11	11	00	11	11
10	11	01	11	01	11	01	11	01	11	11	11	10
11	11	10	11	11	11	10	11	11	11	00	11	10
12	11	10	11	00	11	10	11	00	11	01	11	01
13	11	00	11	11	11	00	11	11	11	00	11	00
14	11	00	11	11	11	00	11	11	11	10	11	01

### Table 18: Pilot Symbol Pattern

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain transport format combination of the FACHs and/or PCHs currently in use. This correspondence is (re-)negotiated at each FACH/PCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

### 5.3.3.6 Physical Downlink Shared Channel (PDSCH)

The Physical Downlink Shared Channel (PDSCH) is used to carry the Downlink Shared Channel (DSCH).

A PDSCH corresponds to a channelisation code below or at a PDSCH root channelisation code. A PDSCH is allocated on a radio frame basis to a single UE. Within one radio frame, UTRAN may allocate different PDSCHs under the same PDSCH root channelisation code to different UEs based on code multiplexing. Within the same radio frame, multiple parallel PDSCHs, with the same spreading factor, may be allocated to a single UE. This is a special case of multicode

transmission. All the PDSCHs under the same PDSCH root channelisation code are operated with radio frame synchronisation.

PDSCHs allocated to the same UE on different radio frames may have different spreading factors.

The frame and slot structure of the PDSCH are shown on figure 20.



#### Figure 20: Frame structure for the PDSCH

For each radio frame, each PDSCH is associated with one downlink DPCH. The PDSCH and associated DPCH do not necessarily have the same spreading factors and are not necessarily frame aligned.

All relevant Layer 1 control information is transmitted on the DPCCH part of the associated DPCH, i.e. the PDSCH does not carry Layer 1 information. To indicate for UE that there is data to decode on the DSCH, the TFCI field of the associated DPCH shall be used.

The TFCI informs the UE of the instantaneous transport format parameters related to the PDSCH as well as the channelisation code of the PDSCH.

The channel bit rates and symbol rates for PDSCH are given in table 20.

For PDSCH the allowed spreading factors may vary from 256 to 4.

#### Table 20: PDSCH fields

Slot format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	Ndata <u>1</u>
0	30	15	256	300	20	20
1	60	30	128	600	40	40
2	120	60	64	1200	80	80
3	240	120	32	2400	160	160
4	480	240	16	4800	320	320
5	960	480	8	9600	640	640
6	1920	960	4	19200	1280	1280

When open loop transmit diversity is employed for the PDSCH, STTD encoding is used on the data bits as described in subclause 5.3.1.1.1.

7

CHANGE REQUEST												
ж	25.	<mark>211</mark>	CR	105	:	₩ rev	1	ж	Current vers	sion:	3.6.0	¥
For <b>HELP</b> on using this form, see bottom of this page or look at the pop-up text over the <b>#</b> symbols.												
Proposed change affects: # (U)SIM ME/UE X Radio Access Network X Core Network												
Title: ¥	Cla	rificati	<mark>on of F</mark>	PDSCH d	<mark>efinitio</mark>	n						
Source: ೫	TS	G RAN	WG1									
Work item code: ℜ	TEI								Date: ೫	05-	02-2001	
Category: ೫	F								Release: ೫	R9	9	
Use one of the following categories:Use one of the following releatingF (correction)2A (corresponds to a correction in an earlier release)R96B (Addition of feature),R97C (Functional modification of feature)R98D (Editorial modification)R99D tetailed explanations of the above categories canREL-4be found in 3GPP TR 21.900.REL-5											eases:	
Reason for change	e: ¥	The char Furtl align	curren nelisat ner all l ied.	t definitio tion code PDSCHs	n of PI which in a gi	DSCH i is not ven ce	s misl define II whe	leadin d in th ther fo	g, it uses the ne in 25.211. or a single or	e notic	on of PDS rent UEs a	CH root are frame
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Consequences if not approved:	ж	PDS diffe	CH is a rent ve	ambiguo ndors.	us lead	ling to p	ootent	ial dif	ferent impler	nenta	tions from	١
Clauses affected:	ж	5.3.3	3.6									
Other specs affected:	ж	0 T( 0	ther co est spe &M Sp	re specif cification ecificatio	ication Is Ins	s a	ĥ					
Other comments:	ж	Corr	espond	ding CR o	on 25.2	213						

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- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <u>ftp://www.3gpp.org/specs/</u> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

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.

# 5.3.3.6 Physical Downlink Shared Channel (PDSCH)

The Physical Downlink Shared Channel (PDSCH) is used to carry the Downlink Shared Channel (DSCH).

A PDSCH corresponds to a channelisation code-below or at a PDSCH root channelisation code. A PDSCH is allocated on a radio frame basis to a single UE. Within one radio frame, UTRAN may allocate different PDSCHs under the same PDSCH root channelisation code to different UEs based on code multiplexing. Within the same radio frame, multiple parallel PDSCHs, with the same spreading factor, may be allocated to a single UE. This is a special case of multicode transmission. All the PDSCHs under the same PDSCH root channelisation code are operated with radio frame synchronisation.

The notion of PDSCH root channelisation code is defined in [4].

PDSCHs allocated to the same UE on different radio frames may have different spreading factors.

The frame and slot structure of the PDSCH are shown on figure 20.

CHANGE REQUEST													CR-Form-v4	
H	25.	<mark>.211</mark>	CR	106		Ж r	ev	1	ж	Current v	versio	on:	4.0.0	ж
For <u><b>HELP</b></u> 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 Core Network														
Title: ೫	Cla	rificati	<mark>on of F</mark>	DSCH o	definition of the second s	on								
Source: ೫	TS	<mark>G RAN</mark>	WG1											
Work item code: ೫	TEI	4								Date	: #	05-0	<mark>2-2001</mark>	
Category: ж	Α									Release	: #	REL	-4	
Use one of the following categories:Use one of the following releaseF (correction)2(GSM Phase 2)A (corresponds to a correction in an earlier release)R96(Release 1996)B (Addition of feature),R97(Release 1997)C (Functional modification of feature)R98(Release 1998)D (Editorial modification)R99(Release 1999)Detailed explanations of the above categories canREL-4(Release 4)be found in 3GPP TR 21.900.REL-5(Release 5)										eases:				
Reason for change	э: Ж	The chan Furth align	current inelisat her all l ed.	t definitio ion code PDSCHs	on of P which in a g	DSC h is n given	H is ot de cell y	misle efined whet	eadin d in th her fo	g, it uses ne in 25.2 or a single	the r 11. e or d	notior liffere	of PDS	CH root are frame
Summary of chang	<b>уе:</b> Ж	A ref code It is o	erence is defi clarified	e is adde ined. d that in	d to 2 a cell a	5.213 all PC	whe	ere th H(s) a	ne no are tii	tion of PD me aligne	SC⊢ d.	l root	channe	lisation
Consequences if not approved:	Ħ	PDS diffe	CH is a rent ve	ambiguo ndors.	us lea	ding t	to po	otenti	al dif	ferent imp	oleme	entati	ons from	ו
Clauses affected:	ж	5.3.3	8.6											
Other specs affected:	ж	0 Te 0	ther co est spe &M Sp	re speci cificatior ecificatio	fication ns ons	ns	Ħ							
Other comments:	ж													

### How to create CRs using this form:

- 1) Fill out the above form. The symbols above marked **#** contain pop-up help information about the field that they are closest to.
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