RP-010741

TSG-RAN Meeting #14 Kyoto, Japan, 11 – 14, December, 2001

Title: Agreed CRs (R99 and Rel-4 Category A) to TS 25.221

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	25.221	064	1	R1-01-1271	Transmit diversity for P-CCPCH and PICH	R99	F	TEI	3.8.0	3.9.0
2	25.221	065	1	R1-01-1271	Transmit diversity for P-CCPCH and PICH	Rel-4	Α	TEI	4.2.0	4.3.0
3	25.221	066	-	R1-01-1110	Clarification of midamble transmit power in TS25.221	R99	F	TEI	3.8.0	3.9.0
4	25.221	067	-	R1-01-1110	Clarification of midamble transmit power in TS25.221	Rel-4	Α	TEI	4.2.0	4.3.0

CR-Form-v3															
			(CHAN	IGE	RE	EQ	UE	ST						
ж	25.	221	CR	064		Ж r	ev	1	Ħ	Curre	nt vers	sion:	3.8	B.O	ж
For HELP on using this form, see bottom of this page or look at the pop-up text over the # symbols.															
Proposed change	affect	ts: #	(U)	SIM	ME/	UE	X	Rad	io Ac	cess N	letwor	k X	Cor	re Ne	twork
Title: #	Tra	nsmit	<mark>Diversi</mark>	ty for P-	CCPCI	H and	d Pl	CH							
Source: ೫	TS	G RAN	WG1												
Work item code: %	TEI									Da	ate: ¥	No	vemb	oer 15	5, 2001
Category: ж	F									Relea	nse: #	R9	9		
	Use <u>o</u> Detai be fo	one of f F (ess A (con B (Ada C (Fur D (Edi iled exp und in	the follo ential correspond dition of nctional torial m blanatio 3GPP 1	wing cate orrection) Is to a co feature), modification odification ns of the TR 21.900	egories: rrection tion of fo n) above o).	in ar eature	n ear e) ories	rlier re s can	eleas	Use 2 e) R R R R R R	<u>one</u> of 296 297 298 299 2EL-4 2EL-5	f the fo (GSI (Rele (Rele (Rele (Rele (Rele	ollowin M Phase ease 1 ease 1 ease 1 ease 4 ease 5	ng rele se 2) (996) (997) (998) (999) (999) () ()	ases:
Reason for change	e: X	Exis on L	ting ap JE	proach (STTD)) for F	P-C(CPC	H im	poses (unacce	eptab	le HW	√ con	nplexity
Summary of chang	уе: Ж	Rem as a	oval of recom	STTD a mended	nd intr approa	oduc ach fe	tion or P	of th -CCI	<mark>e Sp</mark> PCH	ace Co and Pl	ode Tr CH.	ansm	it Div	ersity	<mark>/ (SCTD)</mark>
Consequences if not approved:	ж	Excessive HW complexity in UE Isolated impact analysis: The transmit diversity scheme for common control channels in changed. Some impact on WG1 specifications, minimal impact on other WGs.													
Clauses affected	م ە	2 5	2125	270/-		1 F	5 0	57							
Ciauses affected:	ಹ	3, 5.,	5.1.3, 5	o.o. <i>i</i> .o (r	iew), 5	0.4, D.	.5.2	, ၁./							
Other specs affected:	¥	X 01	ther co est spe	re specif cificatior	ication	IS	Ħ	25 25	.224, .433	, 25.22	5, 25.′	102, 2	25.331	1, 25.	.423,
		0	&M Sp	ecificatio	ns										

Other comments:

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.
- 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.

3 Abbreviations

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

BCH	Broadcast Channel
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CDMA	Code Division Multiple Access
DCH	Dedicated Channel
DL	Downlink
DPCH	Dedicated Physical Channel
DRX	Discontinuous Reception
DSCH	Downlink Shared Channel
DTX	Discontinuous Transmission
FACH	Forward Access Channel
FDD	Frequency Division Duplex
FEC	Forward Error Correction
GP	Guard Period
GSM	Global System for Mobile Communication
NRT	Non-Real Time
OVSF	Orthogonal Variable Spreading Factor
P-CCPCH	Primary CCPCH
PCH	Paging Channel
PDSCH	Physical Downlink Shared Channel
PI	Paging Indicator (value calculated by higher layers)
PICH	Page Indicator Channel
Pa	Paging Indicator (indicator set by physical layer)
PRACH	Physical Random Access Channel
PUSCH	Physical Uplink Shared Channel
RACH	Random Access Channel
RF	Radio Frame
RT	Real Time
S-CCPCH	Secondary CCPCH
SCH	Synchronisation Channel
SCTD	Space Code Transmit Diversity
SF	Spreading Factor
SFN	Cell System Frame Number
STTD	-Space Time Transmit Diversity
TCH	Traffic Channel
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
TFC	Transport Format Combination
TFCI	Transport Format Combination Indicator
TFI	Transport Format Indicator
TPC	Transmitter Power Control
TrCH	Transport Channel
TSTD	Time Switched Transmit Diversity
TTI	Transmission Time Interval
UE	User Equipment
UL	Uplink
UMTS	Universal Mobil Telecommunications System
USCH	Uplink Shared Channel
UTRAN	UMTS Terrestrial Radio Access Network

5.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5.2.3 are used for the P-CCPCH. For those timeslots in which the P-CCPCH is transmitted, the midambles $m^{(1)}$ and $m^{(2)}$ are reserved for P-CCPCH in order to support Block STTD <u>Space Code Transmit Diversity (SCTD)</u> antenna diversity and the beacon function, see 5.4 and 5.5. The use of midambles depends on whether <u>SCTD</u> Block STTD is applied to the P-CCPCH:

- If no antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used and $m^{(2)}$ is left unused. The maximum number K_{Cell} of midambles in a cell may be 4, 8 or 16.
- If <u>SCTD</u>-Block STTD-antenna diversity is applied to P-CCPCH, m⁽¹⁾ is used for the first antenna and m⁽²⁾ is used for the diversity antenna. The maximum number K_{Cell} of midambles in a cell may be 8 or 16. The case of 4 midambles is not allowed for <u>SCTD</u>-Block STTD.

5.3.7 The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

5.3.7.1 Mapping of Paging Indicators to the PICH bits

Figure 15 depicts the structure of a PICH burst and the numbering of the bits within the burst. The same burst type is used for the PICH in every cell. N_{PIB} bits in a normal burst of type 1 or 2 are used to carry the paging indicators, where N_{PIB} depends on the burst type: N_{PIB}=240 for burst type 1 and N_{PIB}=272 for burst type 2. The bits $s_{NPIB+1},...,s_{NPIB+4}$ adjacent to the midamble are reserved for possible future use.



Figure 15: Transmission and numbering of paging indicator carrying bits in a PICH burst

Each paging indicator P_q in one time slot is mapped to the bits $\{s_{2Lpi^*q+1},...,s_{2Lpi^*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each paging indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part, as exemplary shown in figure 16 for a paging indicator length L_{PI} of 4 symbols.





The setting of the paging indicators and the corresponding PICH bits (including the reserved ones) is described in [7].

In each radio frame, N_{PI} paging indicators are transmitted, using $L_{PI}=2$, $L_{PI}=4$ or $L_{PI}=8$ symbols. The number of paging indicators N_{PI} per radio frame is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 7 this number is shown for the different possibilities of burst types and paging indicator lengths.

Table 7: Number N _{PI} of paging indicators per time slot for the different burst types and pagi	ing
indicator lengths L _{PI}	_

	L _{PI} =2	L _{PI} =4	L _{PI} =8
Burst Type 1	N _{PI} =60	N _{PI} =30	N _{PI} =15
Burst Type 2	N _{PI} =68	N _{PI} =34	N _{PI} =17

5.3.7.2 Structure of the PICH over multiple radio frames

As shown in figure 17, the paging indicators of N_{PICH} consecutive frames form a PICH block, N_{PICH} is configured by higher layers. Thus, $N_P = N_{PICH} * N_{PI}$ paging indicators are transmitted in each PICH block.



Figure 17: Structure of a PICH block

The value PI (PI = 0, ..., N_{P} -1) calculated by higher layers for use for a certain UE, see [15], is associated to the paging indicator P_{q} in the nth frame of one PICH block, where q is given by

 $q = PI \ mod \ N_{PI}$

and n is given by

 $n = PI \ div \ N_{PI}.$

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [17]. Each bit in the bitmap indicates if the paging indicator P_q associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formulas above is to be performed in Node B to make the association between PI and P_q .

5.3.7.3. PICH Training sequences

The training sequences, i.e. midambles for the PICH are generated as described in subclause 5.2.3. The allocation of midambles depends on whether SCTD is applied to the PICH.

- If no antenna diversity is applied the PICH the midambles can be allocated as described in subclause 5.6.

- If SCTD antenna diversity is applied to the PICH the allocation of midambles shall be as described in [9].

5.4 Transmit Diversity for DL Physical Channels

Table 8 summarizes the different transmit diversity schemes for different downlink physical channel types that are described in [9].

Physical channel type	Open loop	TxDiversity	Closed loop TxDiversity
	TSTD	SCTD Block	
		STTD	
P-CCPCH	_	Х	—
SCH	Х	-	-
DPCH	_	-	Х
PDSCH	_	-	Х
PICH	- '	Х	-

Table 8: Application of Tx diversity schemes on downlink physical channel types "X" – can be applied, "–" – must not be applied

_ --

5.5 Beacon characteristics of physical channels

For the purpose of measurements, physical channels at particular locations (time slot, code) shall have particular physical characteristics, called beacon characteristics. Physical channels with beacon characteristics are called beacon channels. The locations of the beacon channels are called beacon locations. The ensemble of beacon channels shall provide the beacon function, i.e. a reference power level at the beacon locations, regularly existing in each radio frame. Thus, beacon channels must be present in each radio frame.

5.5.1 Location of beacon channels

The beacon locations are determined by the SCH and depend on the SCH allocation case, see subclause 5.3.4:

- Case 1) The beacon function shall be provided by the physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and to TS#k, k=0,...,14.
- Case 2) The beacon function shall be provided by the physical channels that are allocated to channelisation code $C_{Q=16}^{(k=1)}$ and to TS#k and TS#k+8, k=0,...,6.

Note that by this definition the P-CCPCH always has beacon characteristics.

5.5.2 Physical characteristics of beacon channels

The beacon channels shall have the following physical characteristics. They:

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1;
- use midamble m⁽¹⁾ and m⁽²⁾ exclusively in this time slot; and
- midambles m⁽⁹⁾ and m⁽¹⁰⁾ are always left unused in this time slot, if 16 midambles are allowed in that cell.

Note that in the time slot where the P-CCPCH is transmitted only the midambles $m^{(1)}$ to $m^{(8)}$ shall be used, see 5.6.1. Thus, midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot.

The reference power corresponds to the sum of the power allocated to both midambles $m^{(1)}$ and $m^{(2)}$. Two possibilities exist:

- If no <u>SCTD Block STTD</u> antenna diversity is applied to <u>the P-CCPCH and PICH</u>, all the reference power of any beacon channel is allocated to m⁽¹⁾.
- If <u>SCTD Block STTD</u>-antenna diversity is applied to <u>the P-CCPCH and PICH</u> for any beacon channel midambles m⁽¹⁾ and m⁽²⁾ are each allocated half of the reference power. Midamble m⁽¹⁾ is used for the first antenna and m⁽²⁾ is used for the diversity antenna. <u>SCTD is applied to the P-CCPCH and PICH Block STTD</u> encoding is used for the data in P-CCPCH, see [9]; for all other beacon channels identical <u>spread</u> data sequences are transmitted on both antennas.

5.7 Midamble Transmit Power

There shall be no offset between the sum of the powers allocated to all midambles in a timeslot and the sum of the powers allocated to the data symbol fields. The transmit power within a timeslot is hence constant.

The midamble transmit power of beacon channels is equal to the reference power. If <u>SCTD Block STTD</u> is used for the P-CCPCH, the reference power is equally divided between the midambles $m^{(1)}$ and $m^{(2)}$.

The midamble transmit power of all other physical channels depends on the midamble allocation scheme used. The following rules apply

- In case of Default Midamble Allocation, every midamble is transmitted with the same power as the associated codes.
- In case of Common Midamble Allocation in the downlink, the transmit power of this common midamble is such that there is no power offset between the data parts and the midamble part of the overall transmit signal within one time slot.

- In case of UE Specific Midamble Allocation, the transmit power of the UE specific midamble is such that there is no power offset between the data parts and the midamble part of every user within one time slot.

The following figure depicts the midamble powers for the different channel types and midamble allocation schemes. For the UE Specific Midamble Allocation, as an example, code 1 and code 2 are both assigned to UE 1, whereas to UE m is assigned only the code n.

D		Defa	ault Midar	mble Alloo	cation
P				P	Bead
	Code 1	m ^(x)	Code 1		Code
	Code 2	m ^(y)	Code 2		Code
	:	:	:		:
	Code n	m ^(z)	Code n		Cod

Beacon	m ⁽¹⁾	Beacon
Code 1	m ^(x)	Code 1
Code 2	m ^(y)	Code 2
:	:	:
Code n	m ^(z)	Code n

Common Midamble Allocation



UE Specific Midamble Allocation



Figure 18: Midamble powers for the different midamble allocation schemes

CHANGE REQUEST													
			•••				-	• •					
æ	25	.221	CR 06	65	ж	rev	1	ж	Current	t vers	sion:	4.2.0	ж
For HELP on using this form, see bottom of this page or look at the pop-up text over the # symbols.													
Proposed change	affec	ts: Ж	(U)SIN	I N	1E/UE		Radi	io Ac	cess Ne	etwor	k	Core Ne	etwork <mark>x</mark>
Title: ដ	Tra	nsmit	Diversity f	or P-CCF	PCH a	nd Pl	СН						
Source: ೫	TS	<mark>G RAN</mark>	WG1										
Work item code: Ж	TE								Dat	<i>te:</i> Ж	Nove	ember 1	<mark>5, 2001</mark>
Category: ж	Α								Releas	se: ೫	REL	-4	
	Use Deta be fo	one of F (ess A (cor B (Add C (Fui D (Edi iled exp ound in	the followir ential corre responds t dition of fea nctional modi itorial modi blanations 3GPP TR	ng categori ection) to a correct nture), dification (fication) of the abov 21.900.	ies: tion in a of featu ve cate	an ear ure) egories	lier re	elease	Use <u>0</u> 2 8) R9 R9 R9 R9 R8 R1 R1	one of 96 97 98 99 EL-4 EL-5	the follo (GSM I (Releas (Releas (Releas (Releas (Releas (Releas	owing rele Phase 2) se 1996) se 1997) se 1998) se 1999) se 4) se 5)	eases:
Reason for change	e: X	Exis on L	ting appro	ach (STT	FD) for	P-CO	CPCH	H imp	oses ur	nacce	eptable	HW cor	nplexity
Summary of chang	уе: Ж	Rem as a	oval of ST recomme	TD and i nded app	ntrodu proach	iction for P	of th -CCF	e Sp PCH	ace Coo and PIC	de Tra H	ansmit	Diversit	y (SCTD)
Consequences if not approved:	ж	Exce Isola char othe	ted impac nels in ch wGs.	complex analysis anged. S	tity in l s: The come in	JE trans	mit d t on V	ivers VG1	ity sche specific	me fo	or comr s, minii	mon con mal impa	trol act on
Clauses affected.	¥	3 5	313 53	73 (now	1) 51	550	57						
Clauses allected.	ማ	5, 5.	5.1.5,, 5.5	.7.3 (Пем	<i>(</i>), J.4,	0.0.2	., J.7						
Other specs	ж	X O	ther core	specificat	ions	ж	25. 25	.224, 433	25.225,	, 25.1	02, 25	.331, 25	.423,
affected:		Te O	est specifi &M Speci	cations fications			20.						
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.
- 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.

3 Abbreviations

I

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

BCH	Broadcast Channel
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CDMA	Code Division Multiple Access
DCH	Dedicated Channel
DL	Downlink
DPCH	Dedicated Physical Channel
DPY	Discontinuous Recention
DSCU	Downlink Shared Channel
DJU	Discontinuous Transmission
	Discontinuous Transmission Downlink Bilot Channel
DWFCH	Downlink Fliot Channel
DWP15	Downink Phot Time Slot
FACH	Forward Access Channel
FDD	Frequency Division Duplex
FEC	Forward Error Correction
GP	Guard Period
GSM	Global System for Mobile Communication
MIB	Master Information Block
NRT	Non-Real Time
OVSF	Orthogonal Variable Spreading Factor
P-CCPCH	Primary CCPCH
PCH	Paging Channel
PDSCH	Physical Downlink Shared Channel
PI	Paging Indicator (value calculated by higher layers)
PICH	Page Indicator Channel
P _q	Paging Indicator (indicator set by physical layer)
PRACH	Physical Random Access Channel
PUSCH	Physical Uplink Shared Channel
RACH	Random Access Channel
RF	Radio Frame
RT	Real Time
S-CCPCH	Secondary CCPCH
SCH	Synchronisation Channel
SCTD	Space Code Transmit Diversity
SF	Spreading Factor
SFN	Cell System Frame Number
STTD	Space Time Transmit Diversity
ТСН	Traffic Channel
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
TEC	Transport Format Combination
TECI	Transport Format Combination Indicator
TFI	Transport Format Indicator
TPC	Transport Pormat Indicator
TrCH	Transport Channel
TSTD	Time Switched Transmit Diversity
	Transmission Time Interval
	Liser Equipment
	Uplink
	Universal Mobil Telecommunications System
UPPTS	Uplink Pilot Time Slot
UpPCH	Uplink Pilot Channel
USCH	Uplink Shared Channel
ΠΤΡΔΝ	UMTS Terrestrial Radio Access Network

5.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 5.2.3 are used for the P-CCPCH. For those timeslots in which the P-CCPCH is transmitted, the midambles $m^{(1)}$ and $m^{(2)}$ are reserved for P-CCPCH in order to support Block STTD-<u>Space Code transmit Diversity (SCTD)</u> antenna diversity and the beacon function, see 5.4 and 5.5. The use of midambles depends on whether <u>SCTD</u> Block STTD-is applied to the P-CCPCH:

- If no antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used and $m^{(2)}$ is left unused. The maximum number K_{Cell} of midambles in a cell may be 4, 8 or 16.
- If <u>SCTD Block STTD</u>-antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna. The maximum number K_{Cell} of midambles in a cell may be 8 or 16. The case of 4 midambles is not allowed for <u>SCTD</u>-Block STTD.

5.3.7 The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

5.3.7.1 Mapping of Paging Indicators to the PICH bits

Figure 15 depicts the structure of a PICH burst and the numbering of the bits within the burst. The same burst type is used for the PICH in every cell. N_{PIB} bits in a normal burst of type 1 or 2 are used to carry the paging indicators, where N_{PIB} depends on the burst type: N_{PIB}=240 for burst type 1 and N_{PIB}=272 for burst type 2. The bits $s_{NPIB+1},...,s_{NPIB+4}$ adjacent to the midamble are reserved for possible future use.



Figure 15: Transmission and numbering of paging indicator carrying bits in a PICH burst

Each paging indicator P_q in one time slot is mapped to the bits $\{s_{2Lpi^*q+1},...,s_{2Lpi^*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each paging indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part, as exemplary shown in figure 16 for a paging indicator length L_{PI} of 4 symbols.





The setting of the paging indicators and the corresponding PICH bits (including the reserved ones) is described in [7].

In each radio frame, N_{PI} paging indicators are transmitted, using $L_{PI}=2$, $L_{PI}=4$ or $L_{PI}=8$ symbols. The number of paging indicators N_{PI} per radio frame is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 7 this number is shown for the different possibilities of burst types and paging indicator lengths.

Table 7: Number N _{PI} of paging indicators per time slot for the different burst types and pagi	ing
indicator lengths L _{PI}	_

	L _{PI} =2	L _{PI} =4	L _{PI} =8
Burst Type 1	N _{PI} =60	N _{PI} =30	N _{PI} =15
Burst Type 2	N _{PI} =68	N _{PI} =34	N _{PI} =17

5.3.7.2 Structure of the PICH over multiple radio frames

As shown in figure 17, the paging indicators of N_{PICH} consecutive frames form a PICH block, N_{PICH} is configured by higher layers. Thus, $N_P = N_{PICH} * N_{PI}$ paging indicators are transmitted in each PICH block.



Figure 17: Structure of a PICH block

The value PI (PI = 0, ..., N_P-1) calculated by higher layers for use for a certain UE, see [15], is associated to the paging indicator P_q in the nth frame of one PICH block, where q is given by

 $q = PI \ mod \ N_{PI}$

and n is given by

 $n = PI \ div \ N_{PI}.$

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [17]. Each bit in the bitmap indicates if the paging indicator P_q associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formulas above is to be performed in Node B to make the association between PI and P_q .

5.3.7.3. PICH Training sequences

The training sequences, i.e. midambles for the PICH are generated as described in subclause 5.2.3. The allocation of midambles depends on whether SCTD is applied to the PICH.

- If no antenna diversity is applied the PICH the midambles can be allocated as described in subclause 5.6.
- If SCTD antenna diversity is applied to the PICH the allocation of midambles shall be as described in [9].

5.4 Transmit Diversity for DL Physical Channels

Table 8 summarizes the different transmit diversity schemes for different downlink physical channel types that are described in [9].

Table 8: Application of Tx diversity schemes on downlink physical channel types "X" – can be applied, "–" – must not be applied

Physical channel type	Open loop	TxDiversity	Closed loop TxDiversity
	TSTD	<u>SCTD Block</u> STTD	
P-CCPCH	-	Х	-
SCH	Х	_	-
DPCH	-	-	Х
PDSCH	-	-	Х
<u>PICH</u>	-	<u>X</u>	<u>-</u>

5.5.2 Physical characteristics of beacon channels

The beacon channels shall have the following physical characteristics. They:

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1;
- use midamble m⁽¹⁾ and m⁽²⁾ exclusively in this time slot; and
- midambles m⁽⁹⁾ and m⁽¹⁰⁾ are always left unused in this time slot, if 16 midambles are allowed in that cell.

Note that in the time slot where the P-CCPCH is transmitted only the midambles $m^{(1)}$ to $m^{(8)}$ shall be used, see 5.6.1. Thus, midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot.

The reference power corresponds to the sum of the power allocated to both midambles $m^{(1)}$ and $m^{(2)}$. Two possibilities exist:

- If no <u>SCTD Block STTD</u>-antenna diversity is applied to <u>the P-CCPCH</u>, and <u>PICH</u> all the reference power of any beacon channel is allocated to m⁽¹⁾.
- If <u>SCTD Block STTD</u>-antenna diversity is applied to <u>the P-CCPCH and PICH</u> for any beacon channel midambles m⁽¹⁾ and m⁽²⁾ are each allocated half of the reference power. Midamble m⁽¹⁾ is used for the first antenna and m⁽²⁾ is used for the diversity antenna. <u>SCTD is applied to the P-CCPCH and PICH</u>. <u>Block STTD</u> encoding is used for the data in P-CCPCH, see [9]; for all other beacon channels identical <u>spread</u> data sequences are transmitted on both antennas.

5.7 Midamble Transmit Power

There shall be no offset between the sum of the powers allocated to all midambles in a timeslot and the sum of the powers allocated to the data symbol fields. The transmit power within a timeslot is hence constant.

The midamble transmit power of beacon channels is equal to the reference power. If <u>SCTD Block STTD</u> is used for the P-CCPCH, the reference power is equally divided between the midambles $m^{(1)}$ and $m^{(2)}$.

The midamble transmit power of all other physical channels depends on the midamble allocation scheme used. The following rules apply

- In case of Default Midamble Allocation, every midamble is transmitted with the same power as the associated codes.
- In case of Common Midamble Allocation in the downlink, the transmit power of this common midamble is such that there is no power offset between the data parts and the midamble part of the overall transmit signal within one time slot.
- In case of UE Specific Midamble Allocation, the transmit power of the UE specific midamble is such that there is no power offset between the data parts and the midamble part of every user within one time slot.

The following figure 18 depicts the midamble powers for the different channel types and midamble allocation schemes. For the UE Specific Midamble Allocation, as an example, code 1 and code 2 are both assigned to UE 1, whereas to UE m is assigned only the code n.

4	•	201	
	Code 1	m ^(x)	Code 1
	Code 2	m ^(y)	Code 2
	:	:	:
	Code n	m ^(z)	Code n

Default Midamble Allocation

≜		
Beacon	m ⁽¹⁾	Beacon
Code 1	m ^(x)	Code 1
Code 2	m ^(y)	Code 2
:	:	:
Code n	m ^(z)	Code n

Common Midamble Allocation

P ♠

Ρ

Ρ

Code 1		Code 1
Code 2	$m^{(x)}$	Code 2
:	111、1	:
Code n		Code n

Τ		
Beacon	m ⁽¹⁾	Beacon
Code 1		Code 1
Code 2	$m^{(x)}$	Code 2
:		-
Code n		Code n

UE Specific Midamble Allocation



Figure 18: Midamble powers for the different midamble allocation schemes

3GPP TSG RAN Meeting #14 Kyoto, Japan, 11th-14th, December, 2001

			C	CHAN	IGE	RE	Q	UE	ST					CF	₹-Form-v4
ж	25	.221	CR	066		Ж r	ev	-	ж	Currer	nt vers	sion:	3.8.0	9	e
For <mark>HELP</mark> on l	ising t	his for	m, see	bottom	of this	page	or l	ook a	at the	e pop-u	p text	tover	the	/mb	ols.
Proposed change	affec	ts: ¥	(U)S	SIM	ME/	UE	K	Radi	o Aco	cess N	etwor	k <mark>X</mark>	Core N	letw	/ork
Title: ೫	Cla	rificati	<mark>on of m</mark>	<mark>idamble</mark>	e transı	mit po	ower	in T	S25.2	221					
Source: #	TS	<mark>G RAN</mark>	WG1												
Work item code: अ	TE									Da	nte: ೫	14-	<mark>11-2001</mark>		
Category: ೫ Reason for change	F Use Deta be fo	one of F (con A (cor B (ado C (fun D (edi iled exp und in The	the follo rection) respond dition of ctional r torial mo blanatio 3GPP <u>1</u> figures	wing cate ls to a con feature), modification ns of the a <u>R 21.900</u> in section	egories. rrectior fon of fe n) above <u>0</u> .	: eature catego suggo	o <i>earl</i>) ories	<i>ier rei</i> can <mark>hat fc</mark>	lease, or the	Relea Use <u>y</u> 2) R R R R R R R R	se: % one of 96 97 98 99 EL-4 EL-5 It mid	R99 the fo (GSN (Rele (Rele (Rele (Rele (Rele	9 Ilowing re 1 Phase 2 Pase 1996 Pase 1997 Pase 1998 Pase 1999 Pase 4) Pase 5) Pase 5)	on,	ses: there
-		is alv may of po	ways a be ass ossible i	one-to-o ociated y midambl	one ma with se le shift	apping everal is in a	g of (cha cell	code: inneli	s and isatio	d midar on code	nbles es, de	. How pendi	vever, a r ng on the	nida e nu	amble umber
Summary of chang	уе: Ж	Corr	ection o	of the fig	ure										
Consequences if not approved:	ж	Anal not s indic funct	ysis: Th sufficien ated in tionality	nis CR co ntly explic the CR, otherwi	orrects cit. It v but we ise. Th	s a fu vould ould a le CR	nctic not affec clar	on wh affec t imp ifies	t imp bleme the n	he spe plement entation nidamt	cifica tation ns sup ble all	tion w s beh oportir ocatic	vas ambi aving like ng the co on only.	guo e orreo	us or cted
Clauses affected:	ж	5.5	56 57	,											
Other specs Affected:	ж	0 Te 0	ther col est spec &M Spe	re specif cification ecificatio	ficatior ns ons	าร	ж								
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.
- 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.

2

5.7 Midamble Transmit Power

There shall be no offset between the sum of the powers allocated to all midambles in a timeslot and the sum of the powers allocated to the data symbol fields. The transmit power within a timeslot is hence constant.

The midamble transmit power of beacon channels is equal to the reference power. If Block STTD is used for the P-CCPCH, the reference power is equally divided between the midambles $m^{(1)}$ and $m^{(2)}$.

The midamble transmit power of all other physical channels depends on the midamble allocation scheme used. The following rules apply

- In case of Default Midamble Allocation, every midamble is transmitted with the same power as the associated codes.
- In case of Common Midamble Allocation in the downlink, the transmit power of this common midamble is such that there is no power offset between the data parts and the midamble part of the overall transmit signal within one time slot.
- In case of UE Specific Midamble Allocation, the transmit power of the UE specific midamble is such that there is no power offset between the data parts and the midamble part of every user within one time slot.

The following figure depicts the midamble powers for the different channel types and midamble allocation schemes.

Note 1: In figure 18, the codes c(1) to c(16) represent the set of usable codes and not the set of used codes.

Note 2: The common midamble allocation and the midamble allocation by higher layers are not applicable in those beacon time slots, in which the P-CCPCH is located, see section 5.6.1.

For the UE Specific Midamble Allocation, as an example, code 1 and code 2 are both assigned to UE 1, whereas to UE m is assigned only the code n.

Code 1	m ^(x)	Code 1
Code 2	m ^(y)	Code 2
:	:	:
Code n	m ^(z)	Code n

Ρ

Default Midamble Allocation

P 4			
	Beacon	m ⁽¹⁾	Beacon
	Code 1	m ^(x)	Code 1
	Code 2	m ^(y)	Code 2
	:	:	•••
	Code n	m ^(z)	Code n



UE Specific Midamble Allocation

P 4				P	▶			
					Beacon	m ⁽¹⁾	Beacon	
	Code 1	$\mathbf{m}^{(\mathbf{X})}$	Code 1		Code 1	$\mathbf{m}^{(\mathbf{X})}$	Code 1	
	Code 2		Code 2		Code 2		Code 2	
	:	:	:		:	:	:	
	Code n	m ^(y)	Code n	}UE m	Code n	m ^(y)	Code n	}UE m

29

		h	No Beacon Time Slo	ts		Beacon is	Time Slots when Tx not applied to P-CCF	Diversity PCH		Beacon	Time Slots when Tx applied to P-CCPC	Diversity H
	₽♠				Р	↑			Р	•		
Common	F	c(1)	=	Code c(1)		Beacon Channels	Midamble m(1)	Beacon Channels		Beacon Channels	Midamble m(1) Midamble m(2)	Beacon Channels
Midamble		:	Midamble m(x)	:		Code c(n)		Code c(n)		Code c(n)		Code c(n)
Allocation						:	Midamble m(x)				Midamble m(x)	:
		c(16)		Code c(16)		Code c(16)		Code c(16)		Code c(16)		Code c(16)
	×	depends on the	number of transmitte	d codes in that tim	e slot							
	P				Р	†			P	<u> </u>		
	-	c(1)	· · · · · · · · · · · · · · · · · · ·	Code c(1)		Beacon		Beacon		Beacon	Midamble m(1)	Beacon
		: c(M)	Midamble m(1)	: Code c(M)		Channels	Midamble m(1)	Channels		Channels	Midamble m(2)	Channels
Default		c(M+1)		c(M+1)		c(2M+1)		c(2M+1)		c(2M+1)		c(2M+1)
Midamble			Midamble m(2)			:	Midamble m(3)	:			Midamble m(3)	
Allocation		c(2M)		c(2M)		c(3M)		c(3M)		c(3M)		c(3M)
	⊢	c(16-M+1)		(Koru) :		Code c(16-M+1)		Code c(16-M+1)		Code c(16-M+1)		Code c(16-M+1)
	-		Wildamble m(K _{CELL})	Codo o(16)		E Codo o(16)	Midamble m(K _{CELL})	Codo o(16)		Codo o(16)	widamble m(K _{CELL})	Code o(16)
				0000 0(10)		00000(10)		0000 0(10)		0000 0(10)		0000 0(10)
	ĸ	1: Number of coo C _{CELL} : Number of	des per Midamble (M= usable Midamble Shi	₌16/K _{CELL}); in the P fts in this Cell	-CCPCH	I Time Slot M = 2, i	ndependent of K _{CELL}					
	P↑				Р				P			
		Codes of	Midamble m(1)	Codes of		Beacon	Midamble m(1)	Beacon		Beacon	Midamble m(1)	Beacon
		CCTrCH 1	widamble m(1)	CCTrCH 1		Channels	midamble m(1)	Channels		Channels	Midamble m(2)	Channels
Midamble Allocation by Higher		Codes of CCTrCH 2	Midamble m(2)	Codes of CCTrCH 2		Codes of CCTrCH 1	Midamble m(3)	Codes of CCTrCH 1		Codes of CCTrCH 1	Midamble m(3)	Codes of CCTrCH 1
Layers			:									
		Codes of CCTrCH U	Midamble m(K _{CELL})	Codes of CCTrCH U		Codes of CCTrCH U	Midamble m(K _{CELL})	Codes of CCTrCH U		Codes of CCTrCH U	Midamble m(K _{CELL})	Codes of CCTrCH U
	L K	: Number of CC _{CELL} : Number of	TrCHs in this Time SI usable Midamble Shi	ot, multiple CCTrC fts in this Cell	Hs of on	e user may share o	one midamble					

Figure 18: Midamble powers for the different midamble allocation schemes

3GPP TSG RAN Meeting #14 Kyoto, Japan, 11th-14th, December, 2001

			CHAI	NGE	R	EQ	UE	ST				CR-Form-V4
æ	<mark>25.2</mark>	<mark>21</mark> CI	R <mark>067</mark>		жı	rev	-	ж	Current ve	ersion:	4.2.0	ж
For <u>HELP</u> on us	sing this	s form, s	see bottom	of this	pag	e or	look a	at the	e pop-up te	ext ove	r the ¥ sy	mbols.
Proposed change a	affects:	ж (U)SIM	ME/	/UE	X	Radi	io Ac	cess Netw	ork X	Core N	etwork
Title: ೫	Clarifi	cation o	<mark>f midambl</mark>	e trans	mit p	owe	r in T	S25.	221			
Source: ೫	TSG I	RAN WO	G1									
Work item code: #	TEI								Date:	೫ <mark>14</mark>	<mark>-11-2001</mark>	
Category: #	Δ								Release [.]	# RF	-1 -4	
Galegory.	Use <u>on</u> F A B C D Detailed be foun	e of the f (correction (corresp (addition (function (editorial d explana d in 3GP	ollowing ca on) onds to a co of feature) al modification tions of the P TR 21.90	tegories orrectior , tion of fe on) e above 10.	:: eature categ	n ear e) gories	<i>lier re</i> s can	lease	Use <u>one</u> 2 2 2 8) R96 R97 R98 R99 REL-4 REL-4	of the f (GS) (Rel (Rel (Rel (Rel 4 (Rel 5 (Rel	Dilowing re. M Phase 2, ease 1996, ease 1997, ease 1998, ease 1999, ease 4) ease 5)	leases:))))
Reason for change	: ೫ T i: n c	The figur s always nay be a of possib	res in sections a one-to- associated of midamited of the	one ma one ma with se ole shift	sugg appin evera ts in a	gest f ng of al cha a cel	that fo code annel I.	or the s an lisation	e default m d midamble on codes, c	idambles, Hov depend	e allocatio wever, a n ling on the	on, there nidamble number
Summary of change	e· # (Correctio	on of the fi	aure								
cannary er enang				9410								
Consequences if not approved:	₩ A r ii f	Analysis: ot suffic ndicated unctiona	This CR ciently exp in the CR ality otherw	corrects licit. It v t, but w vise. Th	s a fu would rould ne CF	unction d not affe R cla	on wh affec ct imp rifies	nere ct imp olem the	the specific plementatic entations s midamble a	cation y ons beh upport allocation	was ambig naving like ing the co on only.	guous or e rrected
Clauses affected:	ж <u>5</u>	5 , 5.6,	5.7									
Other specs Affected:	¥	Other Test s O&M	core spec pecificatio Specificati	ificatior ns ons	าร	¥						
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.
- 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.

R1-01-1110

1

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.

5.7 Midamble Transmit Power

There shall be no offset between the sum of the powers allocated to all midambles in a timeslot and the sum of the powers allocated to the data symbol fields. The transmit power within a timeslot is hence constant.

The midamble transmit power of beacon channels is equal to the reference power. If Block STTD is used for the P-CCPCH, the reference power is equally divided between the midambles $m^{(1)}$ and $m^{(2)}$.

The midamble transmit power of all other physical channels depends on the midamble allocation scheme used. The following rules apply

- In case of Default Midamble Allocation, every midamble is transmitted with the same power as the associated codes.
- In case of Common Midamble Allocation in the downlink, the transmit power of this common midamble is such that there is no power offset between the data parts and the midamble part of the overall transmit signal within one time slot.
- In case of UE Specific Midamble Allocation, the transmit power of the UE specific midamble is such that there is no power offset between the data parts and the midamble part of every user within one time slot.

The following figure depicts the midamble powers for the different channel types and midamble allocation schemes.

Note 1: In figure 18, the codes c(1) to c(16) represent the set of usable codes and not the set of used codes.

Note 2: The common midamble allocation and the midamble allocation by higher layers are not applicable in those beacon time slots, in which the P-CCPCH is located, see section 5.6.1.

For the UE Specific Midamble Allocation, as an example, code 1 and code 2 are both assigned to UE 1, whereas to UE m is assigned only the code n.

Code 1	m ^(x)	Code 1
Code 2	m ^(y)	Code 2
:	:	:
Code n	m ^(z)	Code n

Ρ

Default Midamble Allocation

P 4			
	Beacon	m ⁽¹⁾	Beacon
	Code 1	m ^(x)	Code 1
	Code 2	m ^(y)	Code 2
	:	:	•••
	Code n	m ^(z)	Code n



UE Specific Midamble Allocation

Ρ4	L			P				
					Beacon	m ⁽¹⁾	Beacon	
	Code 1	m(x)	Code 1		Code 1	$\mathbf{m}^{(\mathbf{X})}$	Code 1	
	Code 2		Code 2		Code 2	1110.9	Code 2	
	:	:	:		:	:	:	
	Code n	m ^(y)	Code n	}UE m	Code n	m ^(y)	Code n	}UE m

32

	No Beacon Time Slots					Beacon Time Slots when TxDiversity is not applied to P-CCPCH				Beacon Time Slots when TxDiversity is applied to P-CCPCH			
	Р⋪				Р	↑			P	•			
Common	F	c(1)		Code c(1)		Beacon Channels	Midamble m(1)	Beacon Channels		Beacon Channels	Midamble m(1) Midamble m(2)	Beacon Channels	
Midamble		:	Midamble m(x)			Code c(n)		Code c(n)		Code c(n)		Code c(n)	
Allocation						:	Midamble m(x)	:			Midamble m(x)	:	
		c(16)		Code c(16)		Code c(16)		Code c(16)		Code c(16)		Code c(16)	
	×	depends on the	number of transmitte	d codes in that time	e slot	•							
	P		1		Р			1	P			I	
		c(1)	Midamble m(1)	Code c(1)	Beacon	Midauchia ar (4)	Beacon	Beacon	Midamble m(1)	Beacon			
	E	: c(M)	Widamble m(1)	: Code c(M)		Channels	Midamble m(1)	Channels	Channels	Midamble m(2)	Channels		
Default		c(M+1)	-	c(M+1)		c(2M+1)	1	c(2M+1)	c(2M+1)		c(2M+1)		
Midamble			Midamble m(2)				Midamble m(3)				Midamble m(3)		
Allocation	-	c(2M)		c(2M)		c(3M)		c(3M)		c(3M)		c(3M)	
	-	- (40 M - 4)		0.4.40.14.4)				0.1.1.1(10.14.1)		0. d (10 M. 1)		0.1.1.1	
	-	C(16-M+1)	Midamble m(K _{CELL})	Code c(16-IVI+1)	Code c(16-M+1)	Midamble m(K)	Code c(16-IVI+1)		Code c(16-M+1)	Midamble m(K)	Code c(16-M+1)		
	-	: c(16)		: Code c(16)	: Code c(16)	Code c(16)	WIGHTIDIE III(ICCELL)	: Code c(16)		: Code c(16)	WIGGINDIC IN(INCELL)	: Code c(16)	
	N ⊭ P	I: Number of coo C _{CELL} : Number of	des per Midamble (M= usable Midamble Shi	⊧16/K _{CELL}); in the P fts in this Cell	-CCPCH P	I Time Slot M = 2, i	ndependent of K _{CELL}		P	L			
	C	Codes of	Codes of CCTrCH 1 Midamble m(1)	Codes of CCTrCH 1		Beacon		Beacon		Beacon	Midamble m(1)	Beacon	
		CCTrCH 1			Channels	Midamble m(1)	Channels		Channels	Midamble m(2)	Channels		
Midamble Allocation by Higher		Codes of CCTrCH 2	Midamble m(2)	Codes of CCTrCH 2		Codes of CCTrCH 1	Midamble m(3)	Codes of CCTrCH 1		Codes of CCTrCH 1	Midamble m(3)	Codes of CCTrCH 1	
Layers						:							
		Codes of CCTrCH U	Midamble m(K _{CELL})	Codes of CCTrCH U		Codes of CCTrCH U	Midamble m(K _{CELL})	Codes of CCTrCH U		Codes of CCTrCH U	Midamble m(K _{CELL})	Codes of CCTrCH U	
	L K	J: Number of CC C _{CELL} : Number of	TrCHs in this Time SI usable Midamble Shi	ot, multiple CCTrC fts in this Cell	Hs of on	e user may share o	one midamble						

Figure 18: Midamble powers for the different midamble allocation schemes