3GPP TSG RAN Meeting #17 *RP-020579*
Biarritz, France, 3 – 6, September 2002

Title: **Agreed CRs (Rel-4 and Rel-5 Category A) to TS 25.221 and TS 25.224 on "Corrections to transmit diversity mode for TDD beacon-function physical channels"**

Source: **TSG-RAN WG1**

Agenda item: **7.1.4**

No.	Spec	CR	Rev	R1 T-doc	Subject	Phase	Cat	Workitem	V_old	V_new
1	25.221	103	1	R1-02-1183	Corrections to transmit diversity mode for TDD beacon-function physical channels	Rel-4	F	LCRTDD-phys	4.5.0	4.6.0
2	25.221	104	2	R1-02-1183	Corrections to transmit diversity mode for TDD beacon-function physical channels	Rel-5	A	LCRTDD-phys	5.1.0	5.2.0
3	25.224	100	1	R1-02-1183	Corrections to transmit diversity mode for TDD beacon-function physical channels	Rel-4	F	LCRTDD-phys	4.5.0	4.6.0
4	25.224	101	1	R1-02-1183	Corrections to transmit diversity mode for TDD beacon-function physical channels	Rel-5	A	LCRTDD-phys	5.1.0	5.2.0

R1-02-1183

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CHANGE REQUEST

⌘ 25.221 CR 103 ⌘rev 1 ⌘ Current version: 4.5.0 ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Corrections to Transmit Diversity Mode for TDD Beacon-Function Physical Channels
Source:	⌘	TSG RAN WG1
Work item code:	⌘	LCRTDD-phys
Date:	⌘	12/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

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

Reason for change:	⌘	A transmit diversity mode exists within the current specifications that is not correctly documented within 25.221, yet moreover results in severe performance degradations in Rician environments. This mode is applied to physical channels other than P-CCPCH when mapped to beacon.
Summary of change:	⌘	The existing SCTD scheme for P-CCPCH when mapped to beacon is used for all beacon-function physical channels if transmit diversity is active.
Consequences if not approved:	⌘	TDD cannot function correctly in Rician environments if transmit diversity is used and non P-CCPCH channels (eg: S-CCPCH) are mapped to beacon.

Clauses affected:	⌘	6.3.1.3, 6.4, 6.5			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 25.224
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

6.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 6.2.3 are used for the P-CCPCH. For timeslots#0 in which the P-CCPCH is transmitted, the midambles $m^{(1)}$ and $m^{(2)}$ are reserved for P-CCPCH in order to support Space Code Transmit Diversity (SCTD) and the beacon function, see 6.4 and 6.5. The use of midambles depends on whether SCTD 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.
- If SCTD antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna.

6.4 Transmit Diversity for DL Physical Channels

Table 20 summarizes the different transmit diversity schemes for different downlink physical channel types in 1.28Mcps TDD that are described in [9].

Table 20: Application of Tx diversity schemes on downlink physical channel types in 1.28Mcps TDD "X" – can be applied, "–" – must not be applied

Physical channel type	Open loop TxDiversity		Closed loop TxDiversity
	TSTD	SCTD (*)	
P-CCPCH	X	X	–
S-CCPCH	X	X	–
DwPCH	X	–	–
DPCH	X	–	X
PDSCH	X	–X	X
PICH	X	X	-

(*) Note: SCTD may only be applied to physical channels when they are allocated to beacon locations.

6.5 Beacon characteristics of physical channels

For the purpose of measurements, common physical channels that are allocated to ~~at~~ particular locations (time slot, code) shall have particular physical characteristics, called beacon characteristics. Physical channels with beacon characteristics are called beacon channels. The location of the beacon channels is called beacon location. The beacon channels shall provide the beacon function, i.e. a reference power level at the beacon location, regularly existing in each subframe. Thus, beacon channels must be present in each subframe.

6.5.1 Location of beacon channels

The beacon location is described as follows :

The beacon function shall be provided by the physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and $c_{Q=16}^{(k=2)}$ in Timeslot#0.

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

6.5.2 Physical characteristics of the beacon function

The beacon channels shall have the following physical characteristics.

They:

- are transmitted with reference power;
- are transmitted without beamforming;
- use midamble $m^{(1)}$ and $m^{(2)}$ exclusively 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~~ SCTD antenna diversity is not applied to ~~the P-CCPCH~~beacon channels, all the reference power of any beacon channel is allocated to $m^{(1)}$.
- If SCTD antenna diversity is applied to beacon channels~~the P-CCPCH~~, 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. SCTD is applied to the P-CCPCH, see [9]; for all other beacon channels identical spread data sequences are transmitted on both antennas.~~

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CHANGE REQUEST

⌘ **25.221** **CR** **104** ⌘ **rev** **2** ⌘ Current version: **5.1.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Corrections to Transmit Diversity Mode for TDD Beacon-Function Physical Channels
Source:	⌘	TSG RAN WG1
Work item code:	⌘	LCRTDD-phys
Date:	⌘	12/08/2002
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Reason for change:	⌘	A transmit diversity mode exists within the current specifications that is not correctly documented within 25.221, yet moreover results in severe performance degradations in Rician environments. This mode is applied to physical channels other than P-CCPCH when mapped to beacon.
Summary of change:	⌘	The existing SCTD scheme for P-CCPCH when mapped to beacon is used for all beacon-function physical channels if transmit diversity is active.
Consequences if not approved:	⌘	TDD cannot function correctly in Rician environments if transmit diversity is used and non P-CCPCH channels (eg: S-CCPCH) are mapped to beacon.

Clauses affected:	⌘	6.3.1.3, 6.4, 6.5			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 25.224
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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- ~~If no antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used and $m^{(2)}$ is left unused.~~
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S-CCPCH	X	X	–
DwPCH	X	–	–
DPCH	X	–	X
PDSCH	X	–X	X
PICH	X	X	-
HS-SCCH	-	-X	X
HS-PDSCH	-	-	X

(*) Note: SCTD may only be applied to physical channels when they are allocated to beacon locations.

6.5 Beacon characteristics of physical channels

For the purpose of measurements, common physical channels that are allocated to ~~at~~ particular locations (time slot, code) shall have particular physical characteristics, called beacon characteristics. Physical channels with beacon characteristics are called beacon channels. The location of the beacon channels is called beacon location. The beacon channels shall provide the beacon function, i.e. a reference power level at the beacon location, regularly existing in each subframe. Thus, beacon channels must be present in each subframe.

6.5.1 Location of beacon channels

The beacon location is described as follows :

The beacon function shall be provided by the physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and $c_{Q=16}^{(k=2)}$ in Timeslot#0.

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

6.5.2 Physical characteristics of the beacon function

The beacon channels shall have the following physical characteristics.

They:

- are transmitted with reference power;
- are transmitted without beamforming;
- use midamble $m^{(1)}$ and $m^{(2)}$ exclusively in this time slot

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CHANGE REQUEST

⌘ **25.224** **CR** **100** ⌘ **rev** **1** ⌘ Current version: **4.5.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Corrections to Transmit Diversity Mode for TDD Beacon-Function Physical Channels
Source:	⌘	TSG RAN WG1
Work item code:	⌘	LCRTDD-phys
Date:	⌘	12/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Clauses affected:	⌘	5.5			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 25.221
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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5.5 Downlink Transmit Diversity

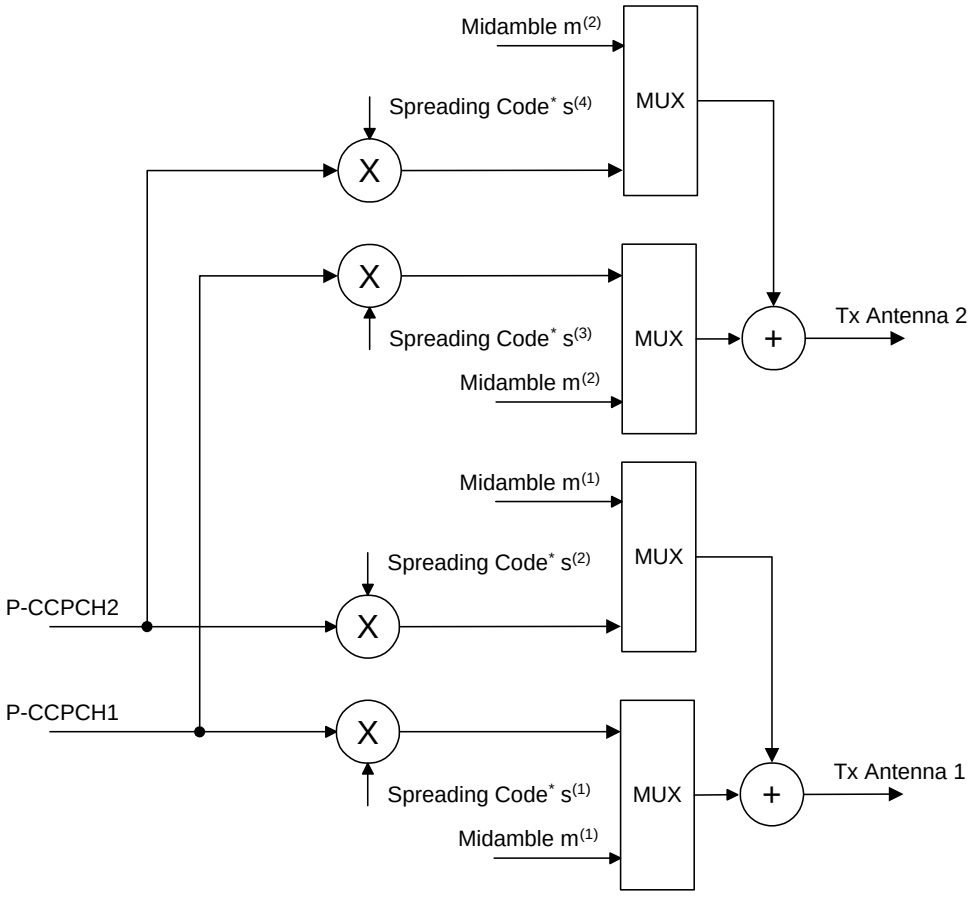
Downlink transmit diversity for PDSCH, DPCH, P-CCPCH, S-CCPCH, PICH and DwPCH is optional in UTRAN. Its support is mandatory at the UE.

5.5.43.2 SCTD Transmission Scheme for Beacon Channels ~~for P-CCPCH~~

The use of SCTD will be indicated by higher layers. If SCTD is active within a cell, SCTD shall be applied to any beacon channel.

The open loop downlink transmit diversity scheme for beacon channels~~the P-CCPCH~~ is shown in figure 10, exemplary for the P-CCPCH. Channel coding, rate matching, interleaving and bit-to-symbol mapping are performed as in the non-diversity mode. In TxDiversity mode the beacon channel that is allocated to code $c_{16}^{(k=1)}$ ~~data sequence on P-CCPCH1~~ is spread with the channelisation codes $c_{16}^{(k=1)}$ and $c_{16}^{(k=3)}$ and scrambled with the cell specific scrambling code. The beacon channel that is allocated to code $c_{16}^{(k=2)}$ ~~data sequence on P-CCPCH2~~ is spread with the channelisation codes $c_{16}^{(k=2)}$ and $c_{16}^{(k=4)}$ and scrambled with the cell specific scrambling code. The spread sequences on code $c_{16}^{(k=3)}$ and code $c_{16}^{(k=4)}$ are then transmitted on the diversity antenna. The power applied to each antenna shall be equal.

The use of SCTD will be indicated by higher layers.



* Spreading by $s^{(k)}$ means channelisation by $c^{(k)}$ and cell specific scrambling

Figure 10: Block Diagram of the transmitter (SCTD) in 1~~.~~28 Mcps TDD, exemplary for the P-CCPCH

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CHANGE REQUEST

⌘ **25.224** **CR** **101** ⌘ **rev** **1** ⌘ Current version: **5.1.0** ⌘

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Work item code:	⌘	LCRTDD-phys
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Category:	⌘	**A**
Release:	⌘	Rel-5

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Consequences if not approved:	⌘	TDD cannot function correctly in Rician environments if transmit diversity is used and non P-CCPCH channels (eg: S-CCPCH) are mapped to beacon.

Clauses affected:	⌘	5.5			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 25.221
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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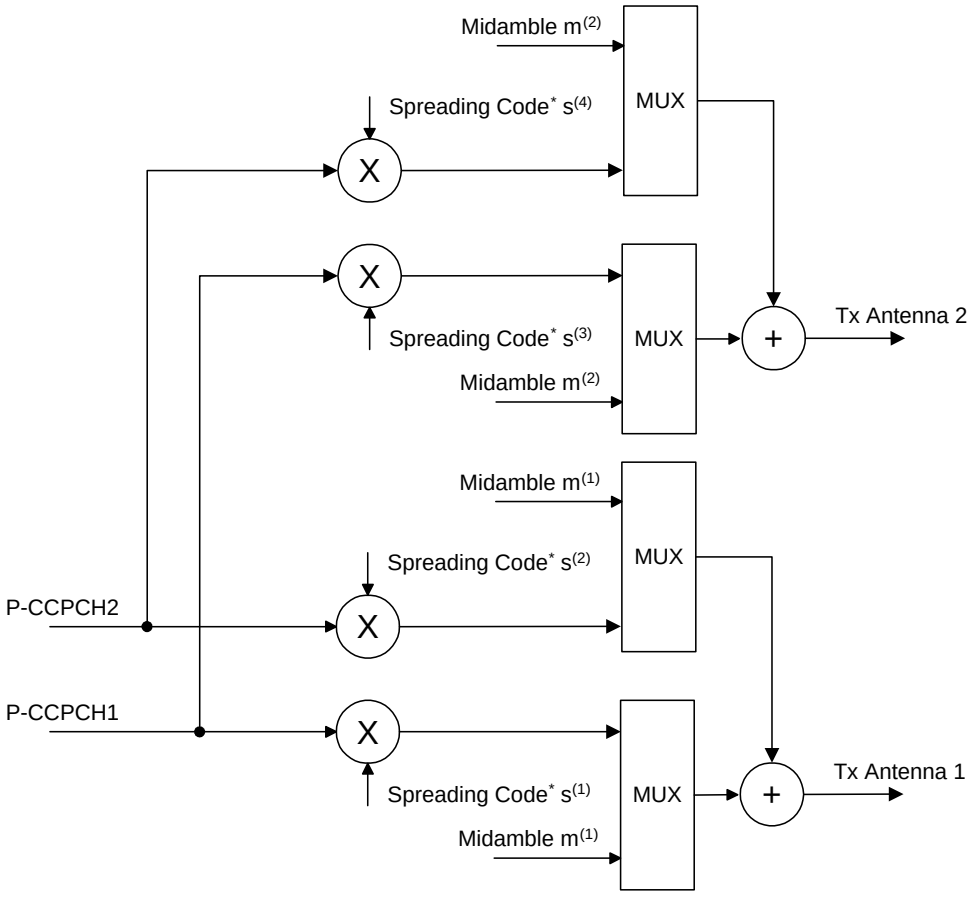
The use of SCTD will be indicated by higher layers.



* Spreading by $s^{(k)}$ means channelisation by $c^{(k)}$ and cell specific scrambling

Figure 10: Block Diagram of the transmitter (SCTD) in 1.,28 Mcps TDD, exemplary for the P-CCPCH