TSG RAN Meeting #14 **RP-010790**

Kyoto, Japan, 11 - 14 December 2001

Title: **CRs (Rel-5) for WI "Beamforming"**

Source: **TSG RAN WG4**

Agenda Item: **9.2.5**

RAN4 Tdoc	Spec	CR	Title	Cat	Phase	Curr Ver	New Ver
R4-011616	25.101	142	Performance requirement for dedicated pilot	B	Rel-5	5.0.0	5.1.0
R4-011619	25.133	240	Active set size limitation for dedicated pilot	B	Rel-5	5.0.0	5.1.0

3GPP TSG RAN WG4 Meeting #20 **R4-011616**

East Brunswick, NJ, USA 12th - 16th November 2001

CR-Form-v4

CHANGE REQUEST

⌘ **25.101** **CR** **142** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Performance requirement for dedicated pilot (revised)
Source:	⌘	RAN WG4
Work item code:	⌘	RANimp-BeamF
Date:	⌘	2001-11-06
Category:	⌘	**B**
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)*
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)*

Reason for change:	⌘	Performance requirements for dedicated pilots have been missing in R99 and REL-4. Beam forming concepts without S-CPICH (using dedicated pilots) relies on good performance required from UE.
Summary of change:	⌘	Test parameters and requirements for these tests have been added into Section 8. Propagation conditions and physical channels during the tests have been added into Annexes.
Consequences if not approved:	⌘	There are no performance requirements for UEs using dedicated pilots to derive the phase reference. Thus the performance of beam forming concept using dedicated pilots would be uncertain.

Clauses affected:	⌘	8.3.1, Annex B.2.2, Annex C.3.5 (New)		
Other specs affected:	⌘	☐ Other core specifications ☒ Test specifications ☐ O&M Specifications	⌘	34.121
Other comments:	⌘			

8.3 Demodulation of DCH in multi-path fading propagation conditions

8.3.1 Single Link Performance

The receive characteristics of the Dedicated Channel (DCH) in different multi-path fading environments are determined by the Block Error Ratio (BLER) values. BLER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into in Dedicated Physical Channel (DPCH).

8.3.1.1 Minimum requirement

For the parameters specified in Table 8.7, 8.9 , 8.11, 8.13 and 8.14A the average downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.8, 8.10, 8.12, 8.14 and 8.14B. For the parameters specified in Table 8.14C the downlink $\frac{DPCH\_E_c}{I_{or}}$ power measured values, which are averaged over one slot, shall be below the specified value in Table 8.14D more than 90% of the time. These requirements are applicable for TFCS size 16. Power control in downlink is ON during the tests 21, 22, 23 and 24.

NOTE: Tests 21, 22, 23 and 24 verify the UE performance with dedicated pilots as a phase reference when the number of dedicated pilot bits is 8 or 16. This does not guarantee the performance of the UE when the number of dedicated pilots bits is 2 or 4. Tests with 2 or 4 dedicated pilots bits are subject of future releases if seen necessary.

Table 8.7: Test Parameters for DCH in multi-path fading propagation conditions (Case 1)

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Phase reference		P-CPICH			
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.8: Test requirements for DCH in multi-path fading propagation conditions (Case 1)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	-15.0 dB	10^{-2}
2	-13.9 dB	10^{-1}
	-10.0 dB	10^{-2}
3	-10.6 dB	10^{-1}
	-6.8 dB	10^{-2}
4	-6.3 dB	10^{-1}
	-2.2 dB	10^{-2}

Table 8.9: DCH parameters in multi-path fading propagation conditions (Case 2)

Parameter	Unit	Test 5	Test 6	Test 7	Test 8
Phase reference		P-CPICH			
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	3	6
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.10: DCH requirements in multi-path fading propagation (Case 2)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
5	-7.7 dB	10^{-2}
6	-6.4 dB	10^{-1}
	-2.7 dB	10^{-2}
7	-8.1 dB	10^{-1}
	-5.1 dB	10^{-2}
8	-5.5 dB	10^{-1}
	-3.2 dB	10^{-2}

Table 8.11: DCH parameters in multi-path fading propagation conditions (Case 3)

Parameter	Unit	Test 9	Test 10	Test 11	Test 12
Phase reference		P-CPICH			
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	3	6
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.12: DCH requirements in multi-path fading propagation conditions (Case 3)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
9	-11.8 dB	10^{-2}
10	-8.1 dB	10^{-1}
	-7.4 dB	10^{-2}
	-6.8 dB	10^{-3}
11	-9.0 dB	10^{-1}
	-8.5 dB	10^{-2}
	-8.0 dB	10^{-3}
12	-5.9 dB	10^{-1}
	-5.1 dB	10^{-2}
	-4.4 dB	10^{-3}

Table 8.13: DCH parameters in multi-path fading propagation conditions (Case 1) with S-CPICH

Parameter	Unit	Test 13	Test 14	Test 15	Test 16
Phase reference		S-CPICH			
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.14: DCH requirements in multi-path fading propagation conditions (Case 1) with S-CPICH

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
13	-15.0 dB	10^{-2}
14	-13.9 dB	10^{-1}
	-10.0 dB	10^{-2}
15	-10.6 dB	10^{-1}
	-6.8 dB	10^{-2}
16	-6.3 dB	10^{-1}
	-2.2 dB	10^{-2}

Table 8.14A: DCH parameters in multi-path fading propagation conditions (Case 6)

Parameter	Unit	Test 17	Test 18	Test 19	Test 20
Phase reference		P-CPICH			
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	3	6
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.14B: DCH requirements in multi-path fading propagation conditions (Case 6)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
17	-8.8 dB	10^{-2}
18	-5.1 dB	10^{-1}
	-4.4 dB	10^{-2}
	-3.8 dB	10^{-3}
19	-6.0 dB	10^{-1}
	-5.5 dB	10^{-2}
	-5.0 dB	10^{-3}
20	-2.9 dB	10^{-1}
	-2.1 dB	10^{-2}
	-1.4 dB	10^{-3}

Table 8.14C: DCH parameters in multi-path fading propagation conditions (Case 7)

Parameter	Unit	Test 21	Test 22	Test 23	Test 24
Phase reference		DPCCH			
$\hat{I}_{or}/I_{oc}$	dB	0	0	6	12
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384
Target quality value on DTCH	BLER	0.01	0.01	0.01	0.1
Maximum DL Power	dB	7			
Minimum DL Power	dB	-18			
DL Power Control step size, Δ_{TPC}	dB	1			
Limited Power Increase	-	"Not used"			

Table 8.14D: DCH requirements in multi-path fading propagation conditions (Case 7)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$
21	-14.0 dB
22	-9.1 dB
23	-9.4 dB
24	-7.4 dB

B.2.2 Multi-path fading propagation conditions

Table B1 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum.

Table B.1: Propagation Conditions for Multi path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, speed 120 km/h		Case 4, speed 3 km/h		* Case 5, speed 50 km/h		Case 6, speed 250 km/h	
Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]
0	0	0	0	0	0	0	0	0	0	0	0
976	-10	976	0	260	-3	976	0	976	-10	260	-3
		20000	0	521	-6					521	-6
				781	-9					781	-9

NOTE: Case 5 is only used in TS25.133.

Table B.1A shows propagation conditions that are used for the performance measurements in multi-path environment when UE is informed by higher layer signalling that only DPCCH exists for channel estimation. All taps have classical Doppler spectrum. Taps are normalized to the strongest tap in the beam/sector. The actual power relation between the sector and the beam is determined by the test case.

Table B.1A: Propagation Conditions for Multi path Fading Environments

Case 7, speed 50 km/h		
Relative Delay [ns]	Average Power [dB]	
	Sector	Beam
0	0.0	-
260	-4.3	-
1040	-6.6	-
4690	-2.0	0.0
7290	-7.0	-0.3
14580	-7.5	-0.9

C.3.5 Connection with tests having DPCCH as a phase reference

Table C.6 is applicable for measurements for tests 21, 22, 23 and 24 in subclause 8.3.1.

Table C.6: Downlink Physical Channels transmitted during a connection

Physical Channel	Antenna (gain)	Power	NOTE
P-CPICH	Sector (0 dB)	P-CPICH_Ec/Ior = -10 dB	UE is informed by higher layer signalling that P-CPICH shall not be used as a phase reference
P-CCPCH		P-CCPCH_Ec/Ior = -12 dB	
SCH		SCH_Ec/Ior = -12 dB	This power shall be divided equally between Primary and Secondary Synchronous channels
PICH		PICH_Ec/Ior = -15 dB	
DPCH	Beam (6.0dB)	Test dependent power	DPCH phase shall be uncorrelated with the phase of P-CPICH (different propagation in sector and beam)
OCNS		Necessary power so that Beam total transmit power is 20 % of Node B total transmit power	1. OCNS interference consists of 16 dedicated data channels as specified in Table C.6. 2. 60% of the power from Node B (Ior) is not involved in the tests, but is still counted as a part of the transmitted power.

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CHANGE REQUEST

⌘ **25.133** **CR** **240** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network ☐

Title:	⌘	Active set size limitation for dedicated pilot (revised)
Source:	⌘	RAN WG4
Work item code:	⌘	RANimp-BeamF
Date:	⌘	2001-11-06
Category:	⌘	**B**
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R96 (Release 1996)
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R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	When using dedicated pilots (for beam forming), it will most likely be in a "mixed" environment", with many cells using dedicated pilots, but many others using common pilots. The likelihood of all 6 links in the Active Set being with dedicated pilot is low. Also, requiring demodulation of all 6 with dedicated is a difficult UE requirement.
Summary of change:	⌘	Active Set size is kept at 6, of which at the most 4 are demodulated with dedicated pilot.
Consequences if not approved:	⌘	High complexity of dedicated pilot demodulation, leading to reduced performance for the dominating cases with fewer link with dedicated pilots.

Clauses affected:	⌘	5.1.2.1
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	⌘	
Other comments:	⌘	

5.1 FDD/FDD Soft Handover

5.1.1 Introduction

Soft handover is a function in which the UE is connected to several UTRAN access points at the same time. Addition and/or release of radio links are controlled by the ACTIVE SET UPDATE procedure.

The soft handover function includes a measurement phase, a decision algorithm in UTRAN and the ACTIVE SET UPDATE procedure.

5.1.2 Requirements

5.1.2.1 Active set dimension

The UE shall be capable of supporting at least 6 radio links in the active set.

As described in TS 25.211, the UE may be informed by UTRAN that for one or more links in the active set neither S-CPICH or P-CPICH is available as phase reference and the UE shall thus use the Dedicated Pilot as phase reference. The UE shall then support at least 6 radio links in the active set, out of which up to 4 radio links are such that the Dedicated Pilot shall be used as a phase reference.