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Attachments: [1] R1-031413

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1. Introduction
Please find attached the latest version of TR 25.803 (v1.2.0) on S-CCPCH performance for MBMS. This version now includes results for 3.84 Mcps TDD as well as clarification on the applicability of some channel models and on the coverage aspects for FDD.

2. Actions
none

3. Date of Next TSG-RAN WG1 Meetings:

TSG-RAN WG1 #36	Feb 16-20, 2004	Malaga, Spain (co-located with R2 & R3)
TSG-RAN WG1 #37	May 10-14, 2004	TBD, North America

3GPP TR 25.803 V1.2.0 (2003-12)

Technical Report

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Contents

Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The scope of this technical report is to capture simulation results for S-CCPCH operation in the context of MBMS as defined in [1].

It is important to note that the results presented in this report are raw simulation results and as such do not include any implementation margins which are typically considered when defining UE performance requirements and would have to be considered when dimensioning network resource required for MBMS deployment.

2 References

[1] 3GPP TR 25.992: "Multimedia Broadcast/Multicast Service (MBMS); UTRAN/GERAN requirements".

[2] 3GPP TS 21.905: "Vocabulary for 3GPP Specifications".

[3] 3GPP TS 21.101: “UE Radio transmission and reception (FDD)”

[4] 3GPP TR 30.03U: “Selection procedures for the choice of radio transmission technologies of the UMTS”

[5] 3GPP TR 25.942 v6.1.0: "Radio frequency (RF) system scenarios"

[6] 3GPP TR 25.996: "Spatial channel model for multiple-input multiple output simulations"

[7] R1-031275 "MBMS Coverage in the Macrocellular Environment (FDD)"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in [2] and the following apply.

Block Error Rate*: error rate of the transport (data) blocks passed by the physical layer to MAC layer for a given transport channel (i.e. physical layer error rate).*

Transmission Time Interval*: interval of time over which a transport block is transmitted; multiple transport blocks may be transmitted in a transmission time interval per transport channel.*

3.2 Abbreviations

BLER	Block Error Rate
SCTD	Space Code Transmit Diversity
STTD	Space Time Transmit Diversity
TSTD	Times Switched Transmit Diversity
TTI	Transmission Time Interval

4 S-CCPCH performance for FDD

4.1 Simulation Assumptions

Table 4.1.1 presents parameters which are commonly used in the subsequent sections. Note that the case 1 and Pedestrian A channel models are not representative of urban macrocellular environments, and the applicability of these models to other environments is FFS.

Table 4.1.1: Simulation parameters

Parameter	Value
S-CCPCH Slot format	6 (16 kbps) 8 (32 kbps) 10 (64 kbps) 12 (128 kbps) 11 (for VA30 results)
Transport Block Size & number of transport blocks per TTI	Varied according to information rate (16, 32, 64 or 128 kbps) and TTI value.
CRC	16 bits
Transmission interval (TTI)	20 ms, 40ms and 80ms
CPICH Ec/Ior	-10 dB (10%)
P-SCH Ec/Ior	-15 dB (3%)
S-SCH Ec/Ior	-15 dB (3%)
Tx Ec/Ior	Varied
OCNS	Used to sum the total Tx Ec/Ior to 0 dB (100%)
Geometry (Iôr/Ioc)	-3 dB -6 dB
Channel estimation	Enabled
Power Control	Disabled
Channel	Case 1, 3 kmh [3] Case 2, 3kmh [3] Pedestrian A, 3 km/h [4] Pedestrian B, 3 km/h [4] Vehicular-A. 3 kmh [4] Vehicular-A, 30 kmh [4]

Results are presented in terms of Ec/Ior [dB] representing the fraction of cell transmit power necessary to achieve the corresponding BLER performance graduated on the vertical axis. Examples of conversion of Ec/Ior [dB] to cell power fraction [%] are shown in table 4.1.2.

Table 4.1.2: Conversion of Ec/Ior [dB] to fraction of cell transmit power [%]

Ec/Ior	%Tx	Ec/Ior	%Tx	Ec/Ior	%Tx
0.0	100.0%	-5.5	28.2%	-11.0	7.9%
-0.5	89.1%	-6.0	25.1%	-12.0	6.3%
-1.0	79.4%	-6.5	22.4%	-13.0	5.0%
-1.5	70.8%	-7.0	20.0%	-14.0	4.0%
-2.0	63.1%	-7.5	17.8%	-15.0	3.2%
-2.5	56.2%	-8.0	15.8%	-16.0	2.5%
-3.0	50.1%	-8.5	14.1%	-17.0	2.0%
-3.5	44.7%	-9.0	12.6%	-18.0	1.6%
-4.0	39.8%	-9.5	11.2%	-19.0	1.3%
-4.5	35.5%	-10.0	10.0%	-20.0	1.0%
-5.0	31.6%				

4.2 Performance using Release-5 functionality

Two main parameters can be used in Release-5 to influence the S-CCPCH performance. They are the TTI value and the transmit diversity. The following sections capture performance results with various combination of TTI values and transmit diversity.

4.2.1 Performance using various TTI values

Figure 4.2.1-4.2.3 show the S-CCPH power requirement as a fraction of the Node B power when transmitting at 16, 32, 64 and 128 kbps with various TTI values. The results are without transmit diversity.

4.2.1.1 Results for Case 1 – 3 kmh

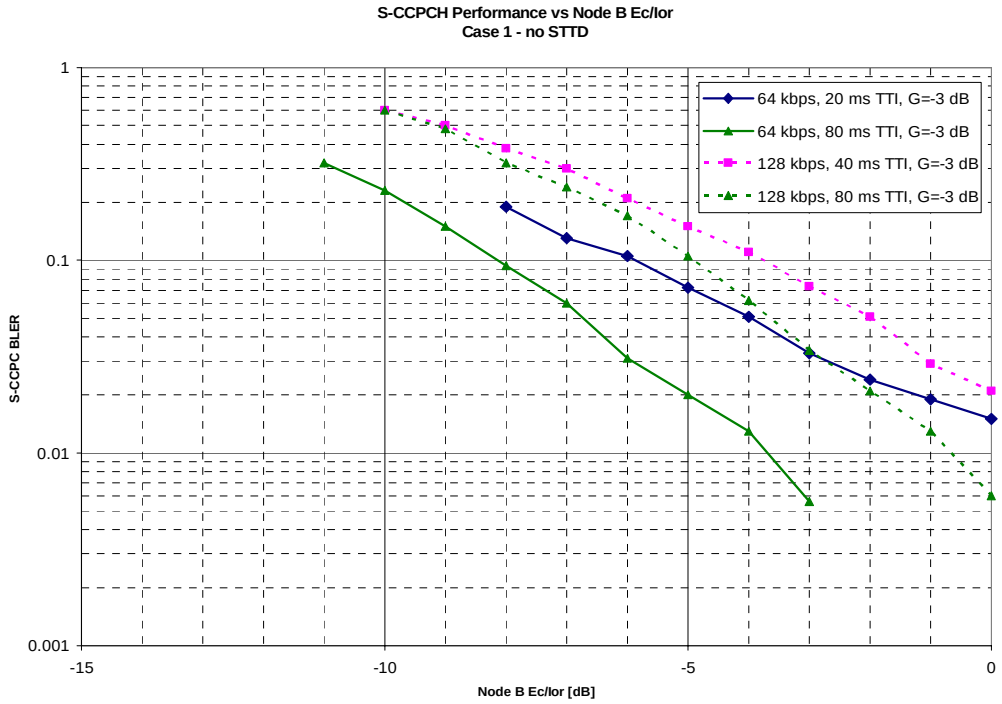

Figure 4.2.1: BLER vs. Tx Power - Case 1 (3 kmh)

4.2.1.2 Results for Case 2 – 3 kmh

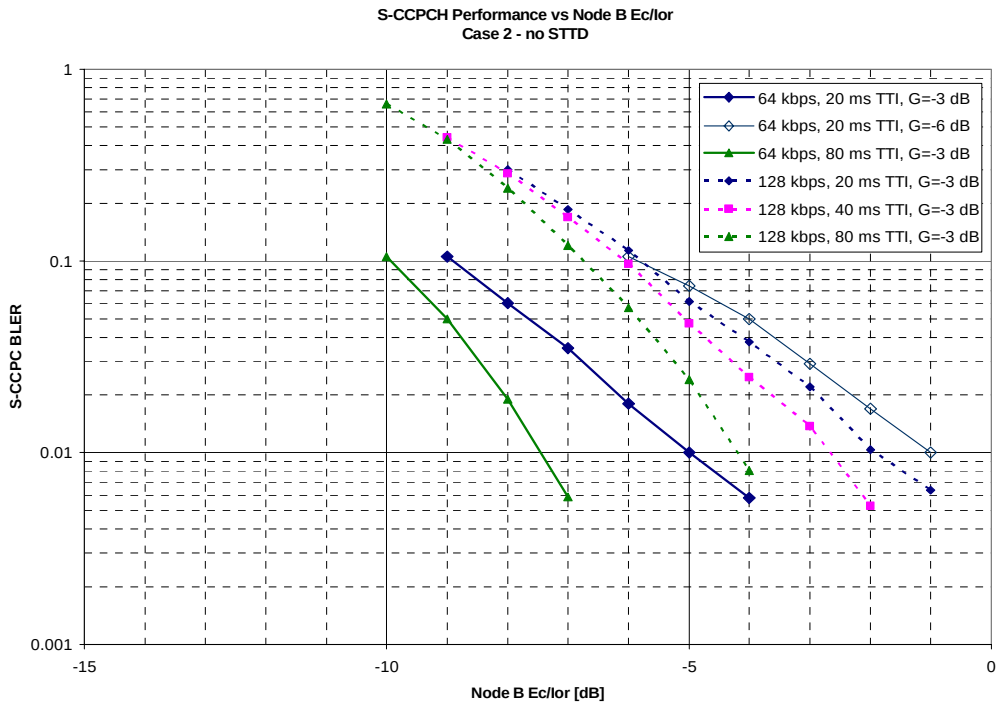

Figure 4.2.2: BLER vs. Tx Power - Case 2 (3 kmh)

4.2.1.3 Results for Vehicular – A (3 kmh)

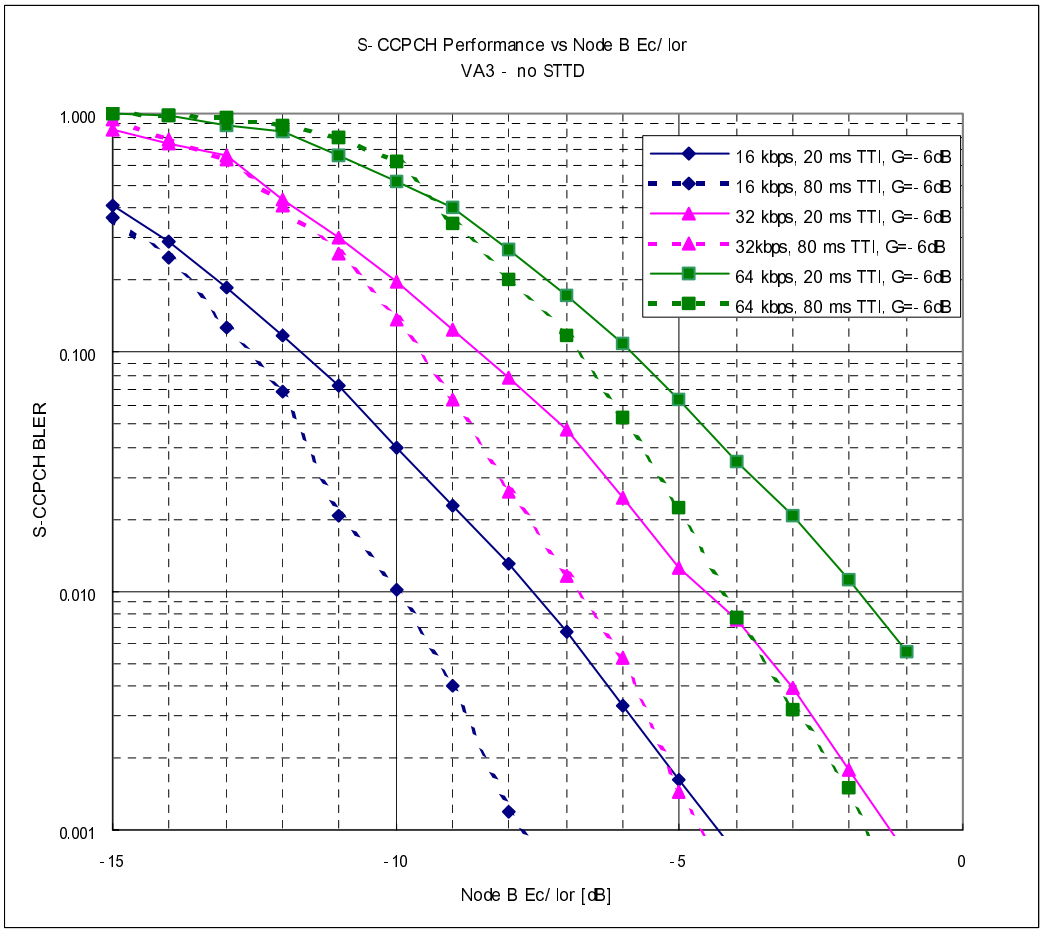

Figure 4.2.3: BLER vs. Tx Power – VA3

It should be noted that reference UE configurations labelled with a particular data rate (e.g. 64 kbps class) may not support that particular rate when operating with TTI values higher than 10 ms as defined in [TS 25.306]

4.2.2 Performance using open loop transmit diversity

Figures 4.2.4-4.2.9 show the S-CCPH requirement when transmitting at 16, 32, 64 and 128 kbps with various TTI values and STTD enabled.

4.2.2.1 Results for Case 1 – 3 kmh

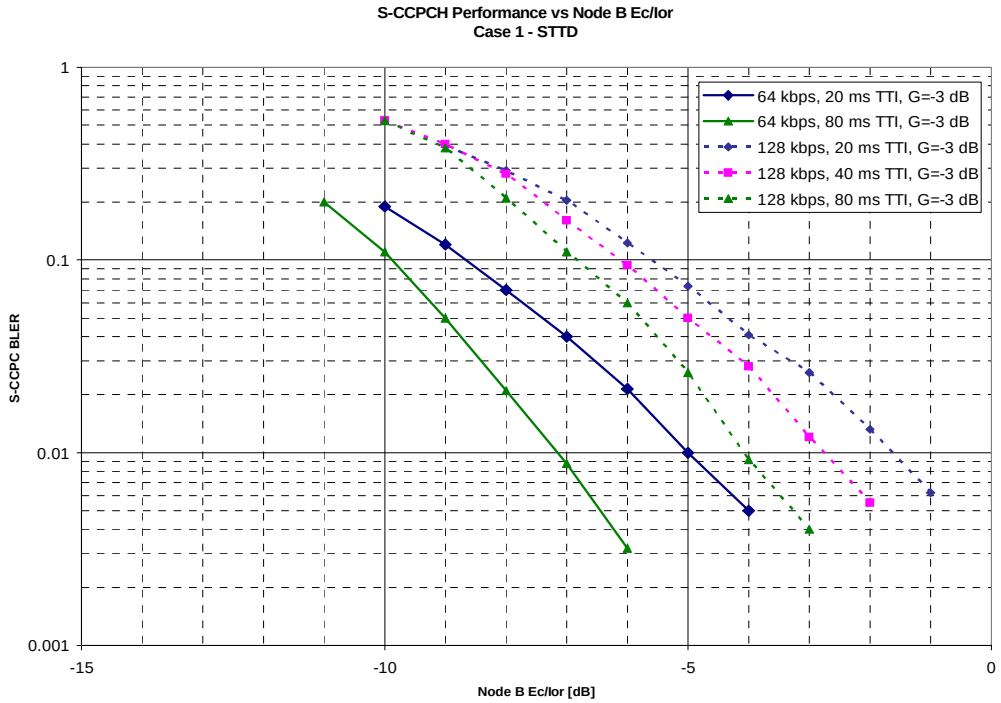

Figure 4.2.4: BLER vs. Tx Power – case 1

4.2.2.2 Results for Case 2 – 3 kmh

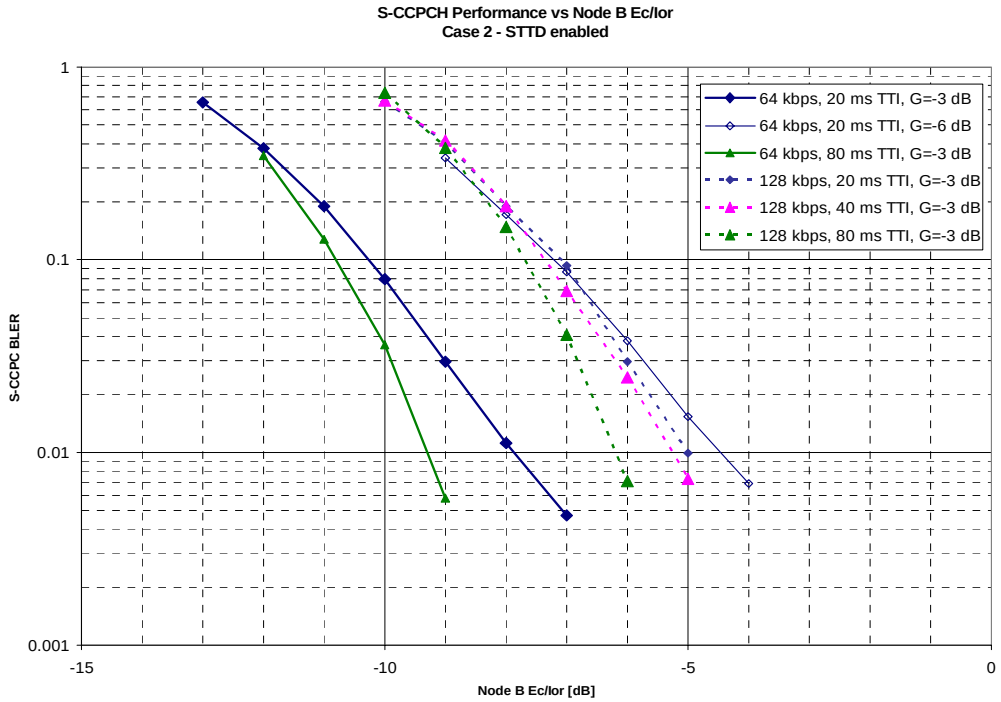

Figure 4.2.5: BLER vs. Tx Power – case 2

4.2.2.3 Results for Vehicular A (3 kmh)

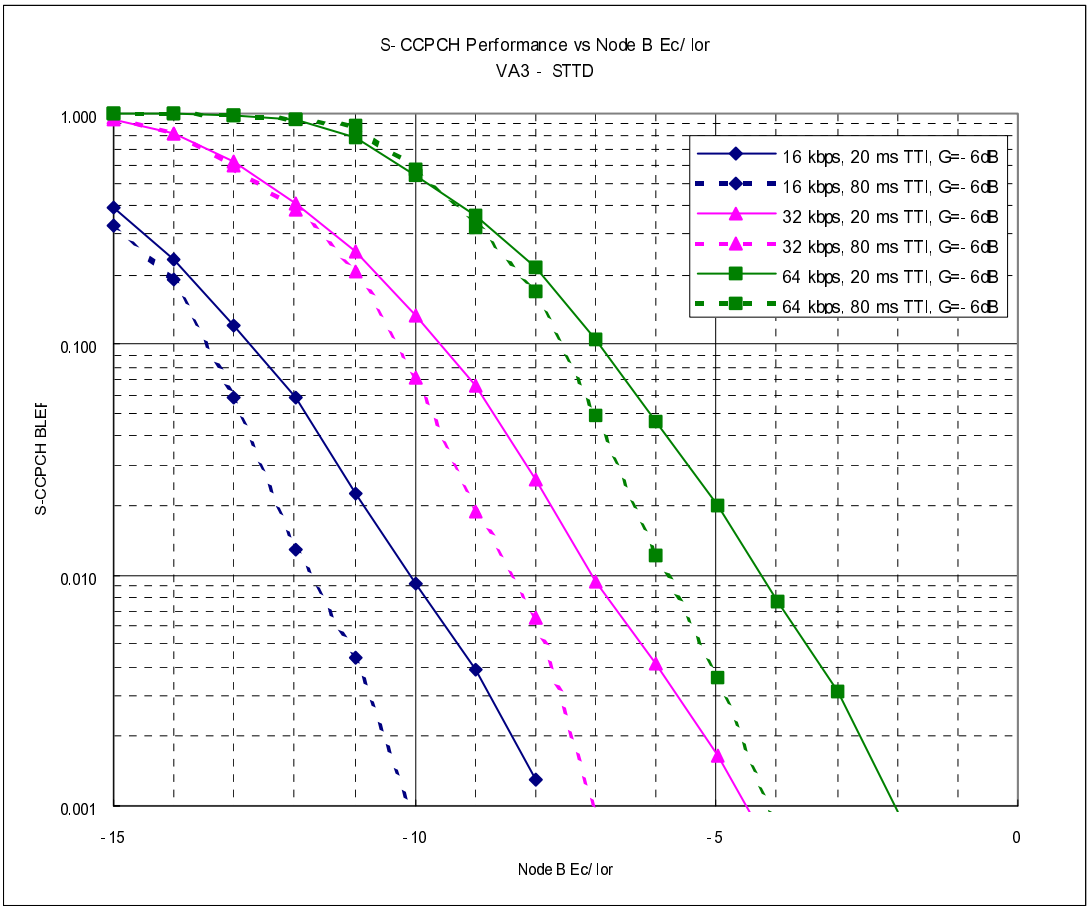

Figure 4.2.6: BLER vs. Tx Power – case 2

4.2.2.4 Results for Pedestrian A (3 kmh)

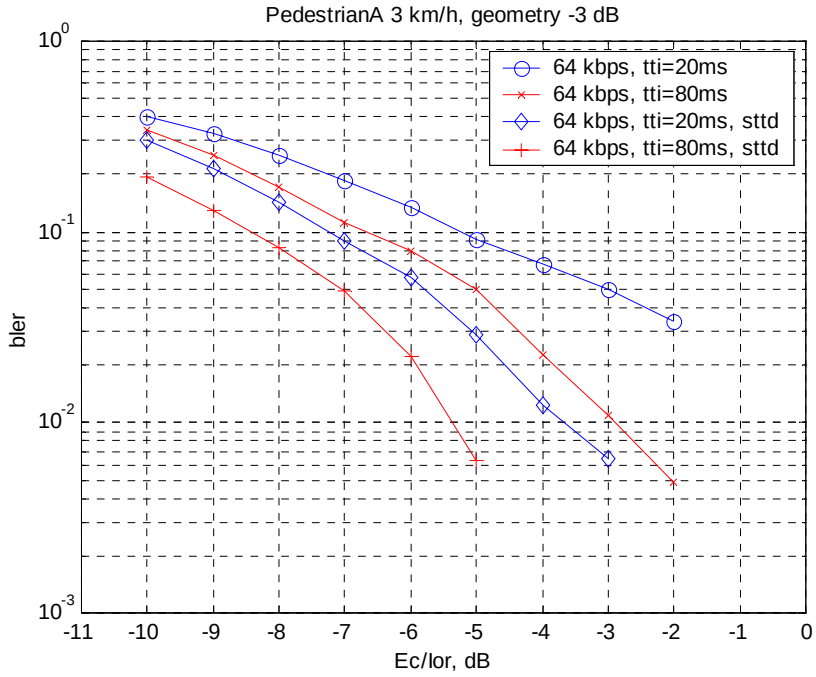

Figure 4.2.7: BLER vs. Tx Power – Pedestrian A (3kmh)

4.2.2.5 Results for Pedestrian B (3 kmh)

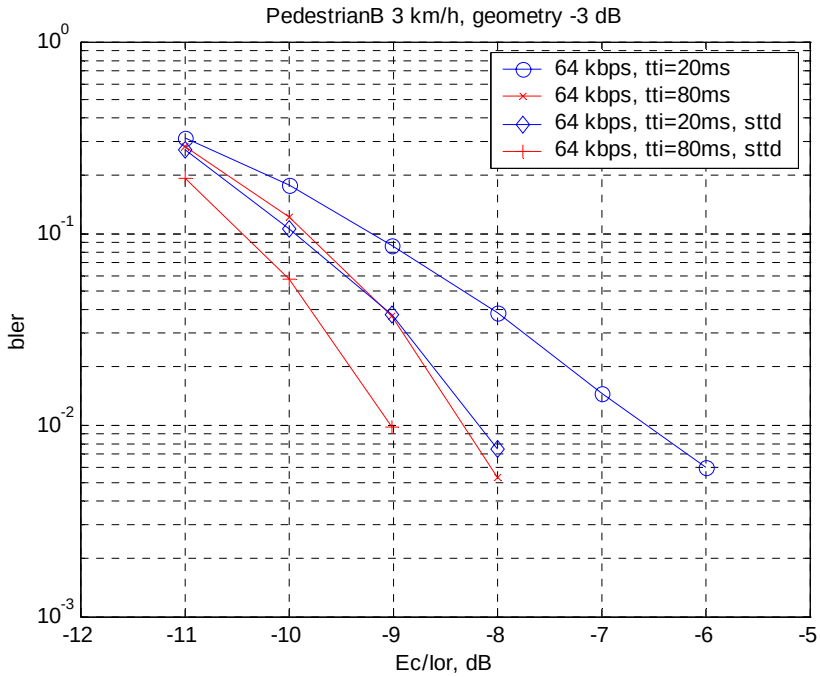

Figure 4.2.8: BLER vs. Tx Power – Pedestrian B (3 kmh)

4.2.2.6 Results for Vehicular - A (30 kmh)

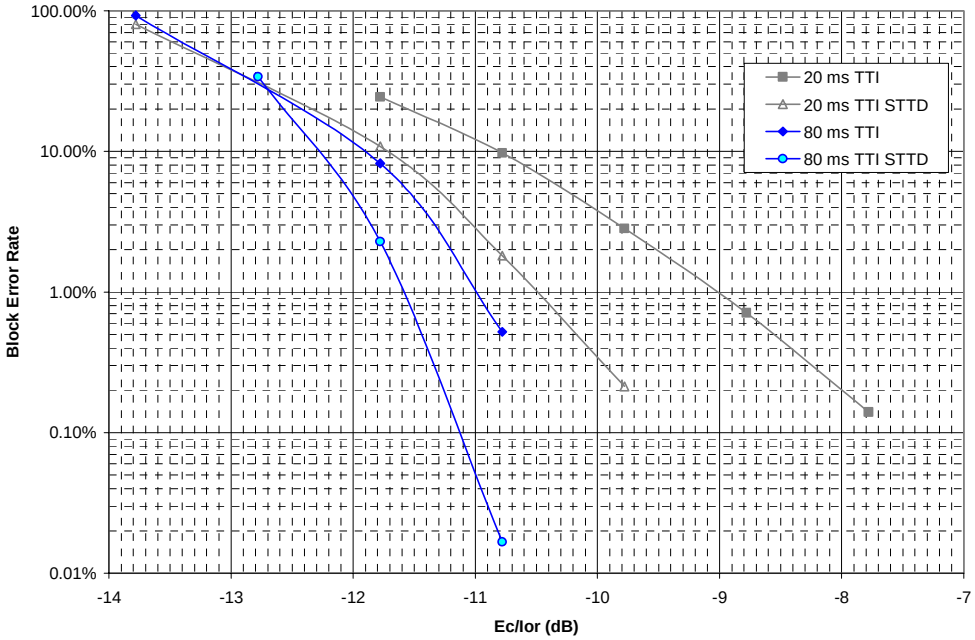

Figure 4.2.9: BLER vs. Tx Power – VA30

Figure 4.2.9 shows the performance of 64 kbps S-CCPCH for Vehicular-A channel model at 30 kph. It may be observed from the figure that by increasing the TTI from 20 to 80 ms the power allocation is reduced by approximately 1.5 dB and 0.5 dB for the no STTD and STTD case respectively.

4.3 Performance using new functionality

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4.4 Summary

This section provides a summary of the results.

Tables 4.4.1-4.4.6 show the SCCPCH power requirement as a fraction of the cell power for different data rates, geometries (i.e. cell coverage) and error rate targets and as a function of physical layer configurations (TTI value & transmit diversity mode) and propagation environment (i.e. radio channel models). Note that the case 1 and Pedestrian A channel models are not representative of urban macrocellular environments, and the applicability of these models to other environments is FFS.

4.4.1 Results with Case 1 (3 kmh)

Table 4.4.1: Required fraction of cell Tx power -- Case 1 channel – 3 kmh

Data Rate	TTI	Geometry	Fraction of cell Tx power for 1% BLER	
			Tx diversity disabled	Tx diversity enabled
64 kbps	20 ms	-3 dB	>100%	31.6%
64 kbps	80 ms	-3 dB	42.7%	19.5%
128 kbps	20 ms	-3 dB	>100%	69.2%
128 kbps	40 ms	-3 dB	>100%	53.7%
128 kbps	80 ms	-3 dB	87.1%	39.8%

4.4.2 Results with Case 2 (3 kmh)

Table 4.4.2: Required fraction of cell Tx power – Case 2 channel – 3kmh

Data Rate	TTI	Geometry	Fraction of cell Tx power for 1% BLER	
			Tx diversity disabled	Tx diversity enabled
64 kbps	20 ms	-3 dB	31.6%	16.2%
64 kbps	20 ms	- 6 dB	79.4%	35.5%
64 kbps	80 ms	-3 dB	17.8%	11.7%
128 kbps	20 ms	-3 dB	63.1%	31.6%
128 kbps	40 ms	-3 dB	53.7%	29.5%
128 kbps	80 ms	-3 dB	38.0%	24.0%

4.4.3 Results with Pedestrian-A (3 kmh)

Table 4.4.3: Required fraction of cell Tx power – Pedestrian A – 3kmh

Data Rate	TTI	Geometry	Fraction of cell Tx power for 1% BLER	
			Tx diversity disabled	Tx diversity enabled
64 kbps	20 ms	-3 dB	>63.1%	42.7%
64 kbps	80 ms	-3 dB	51.3%	29.5%

4.4.4 Results with Pedestrian-B (3 kmh)

Table 4.4.4: Required Tx Ec/Ior for target BLER -- Pedestrian B – 3kmh

Data Rate	TTI	Geometry	Fraction of cell Tx power for 1% BLER	
			Tx diversity disabled	Tx diversity enabled
64 kbps	20 ms	-3 dB	22.4%	15.1%
64 kbps	80 ms	-3 dB	14.8%	12.6%

4.4.5 Results with Vehicular-A (3 kmh)

Table 4.4.5: Required fraction of cell Tx power – Vehicular A – 3 kmh

Data Rate	TTI	Geometry	Fraction of cell Tx power for 1% BLER	
			Tx diversity disabled	Tx diversity enabled
16 kbps	20 ms	-6 dB	17.4%	9.8%
16 kbps	80 ms	-6 dB	10.0%	6.6%
32 kbps	20 ms	-6 dB	34.7%	19.5%
32 kbps	80 ms	-6 dB	20.9%	14.5%
64 kbps	20 ms	-6 dB	66.1%	37.2%
64 kbps	80 ms	-6 dB	38.0%	26.3%

4.4.6 Results with Vehicular-A (30 kmh)

Table 4.4.6: Required fraction of cell Tx power - Vehicular A -30 kmh

Data Rate	TTI	Geometry	Fraction of cell Tx power for 1% BLER	
			Tx diversity disabled	Tx diversity enabled
64 kbps	20 ms	-3 dB	12.6%	8.9%
64 kbps	80 ms	- 3 dB	7.9%	6.9%

4.5 Coverage Estimates

4.5.1 Urban Macrocell

This section provides coverage estimates for the urban macrocell scenario. The coverage was calculated based on the following two inputs [7]:

- Release-5 functionality link level curves present in this TR.
- The geometry CDF function specific to the macrocellular environment.

4.5.1.1 Macrocell Geometry Distribution

The geometry CDF was obtained using a typical set of simulation assumptions drawn from [4][5] and collected in table 4.5.1. The resulting geometry distribution is shown in figure 4.5.1.

Table 4.5.1 Simulation assumptions.

Parameter	Value
cellular layout	hexagonal grid
number of rings around central site	4
sectorisation	yes, 3 sectors/site
site to site distance	1000 m
NodeB antenna gain + cable loss	14 dBi
antenna front to back ratio	20 dB
horizontal antenna pattern	Gaussian
antenna beamwidth, -3 dB	70 degrees
propagation model	PL = 128.1 + 37.6*log(R) dB
std of shadow fading	10 dB
correlation between sites for slow fading	0.5
BS total transmit power	43 dBm
thermal noise	-174 dBm/Hz
UE noise figure	9 dB
HO threshold	3 dB

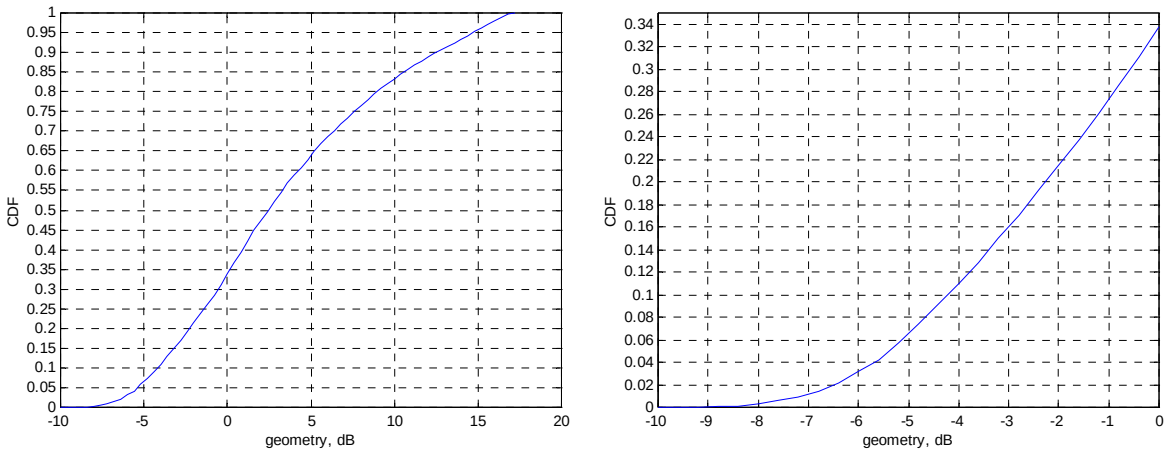

Figure 4.5.1 Geometry CDF for the macrocellular environment. (The right-hand plot shows the most relevant range of geometry values.)

4.5.1.2 Coverage Figures with Release-5 Functionality

The Vehicular A and Pedestrian B channel models are representative for the urban macrocellular scenario [6]. The coverage estimates for these channels are shown in figure 4.5.2 as a function of power dedicated to S-CCPCH, for a 64 kbps service, 80 ms TTI and 1% BLER target. As can be seen from figure 4.5.2, 90-95% coverage can be achieved with 12-30% of the total transmit power when STTD is disabled.

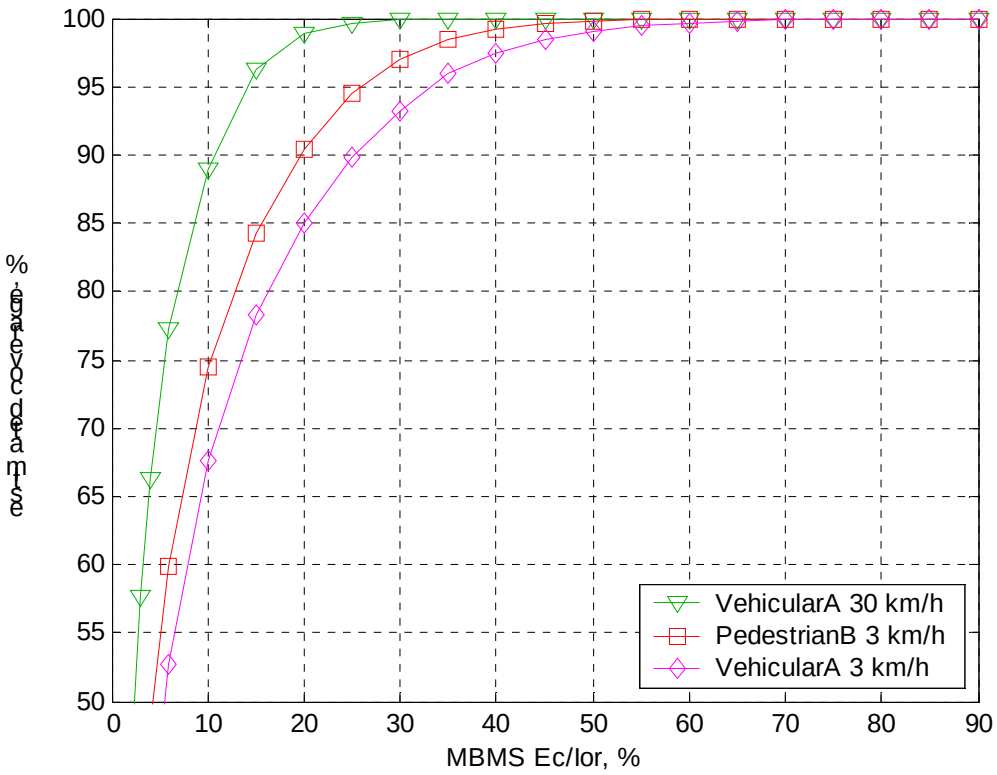

Figure 4.5.2: Estimated coverage vs. fraction of total Tx power (64 kbps, 80ms TTI, STTD off, 1% BLER).

5 S-CCPCH performance for 3.84 Mcps TDD

5.1 Simulation Assumptions

Table 5.1.1 presents simulation parameters that have been used in Section 5.2.

Table 5.1.1: Simulation parameters

Parameter	Value
S-CCPCH slot format	0 (32 kbps) 6 (64 & 128 kbps)
Transport block size	640 (32 kbps) 1280 (64 kbps) 2560 (128 kbps)
CRC length	16 bit
FEC coding	Turbo
TTI	20 ms, 80 ms
Spreading factor	16
MBMS timeslots per cell	1
$\sum DPCH\_Ec/Ior$	0 dB
Power control	None
Channel estimation	Realistic
Detection	JD-MMSE
Multipath channels	Case1 as per TS 25.102
Carrier frequency	2000 MHz
UE velocity	3 kmh

5.2 Performance using Release-5 functionality

In this Section the effects of TTI length upon the performance of S-CCPCH have been studied.

5.2.1 The effect of TTI length on MBMS performance

Figures 5.2.1 to 5.2.3 indicate the effect of increasing the TTI length from 20ms to 80ms for data rates of 32 kbps, 64 kbps and 128 kbps.

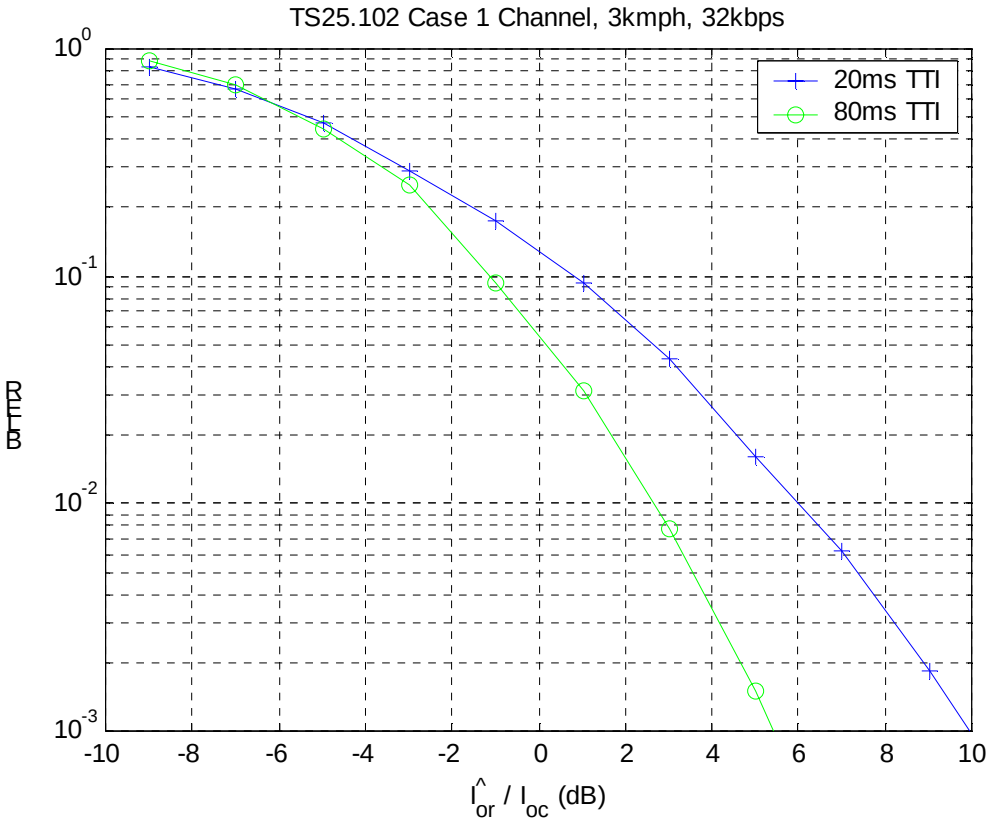

Figure 5.2.1: BLER versus TTI length, 32 kbps, Case 1

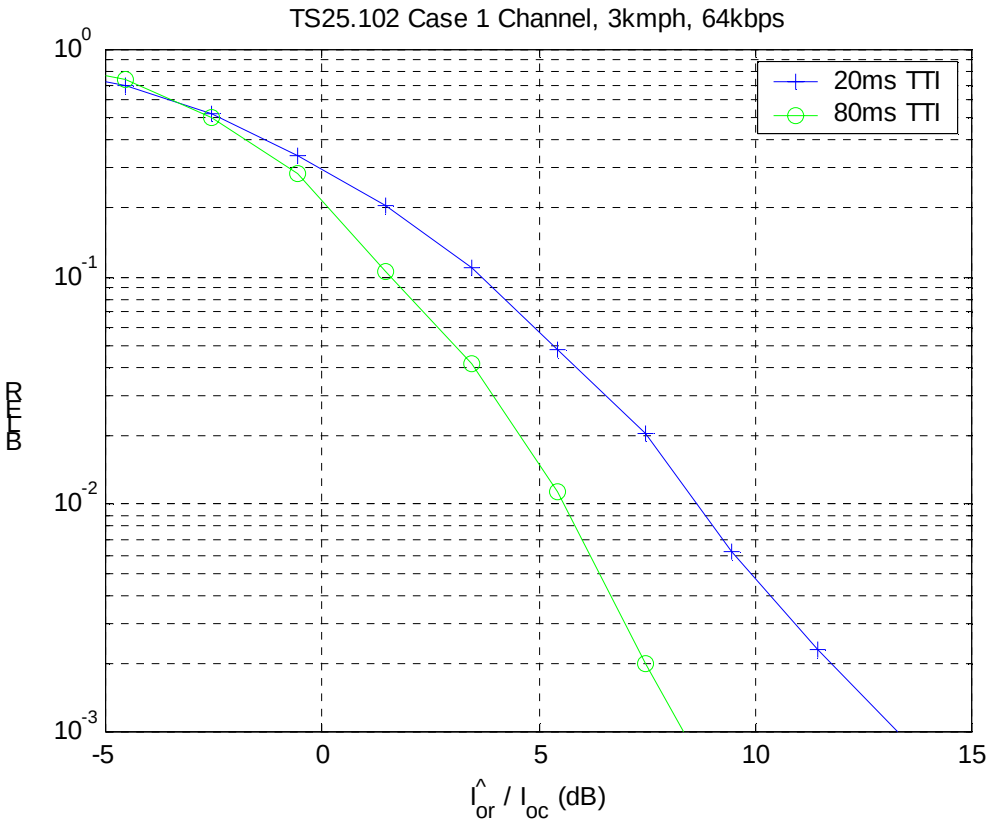

Figure 5.2.2: BLER versus TTI length, 64 kbps, Case 1

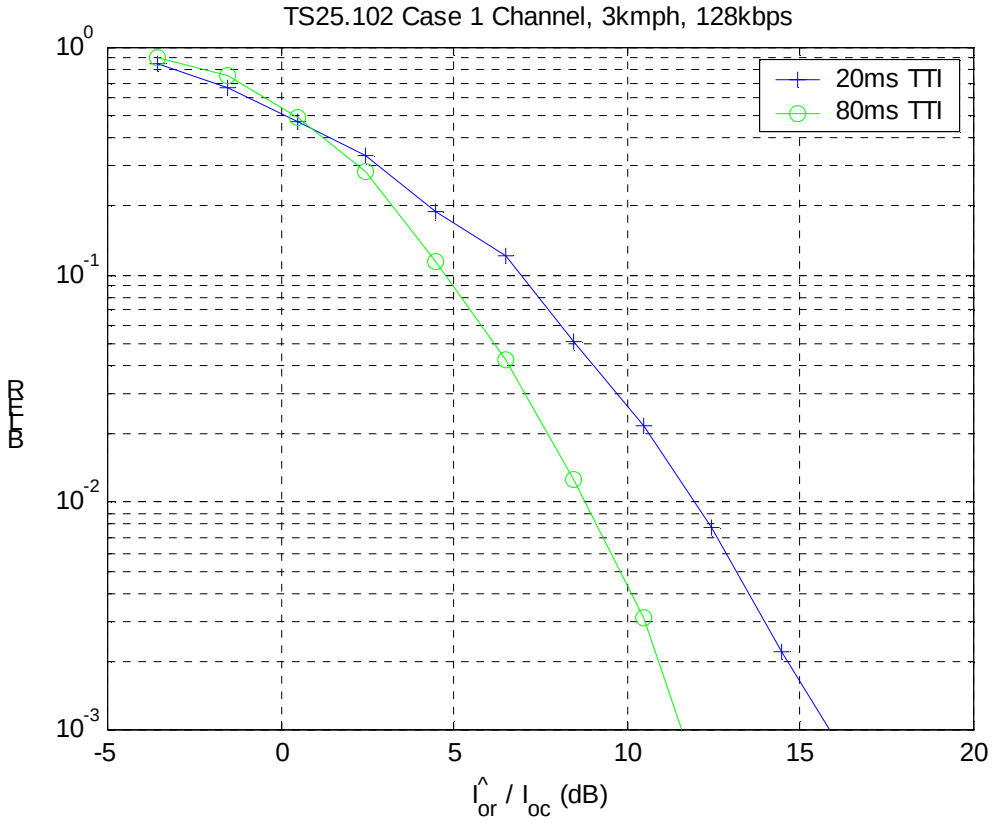

Figure 5.2.3: BLER versus TTI length, 128 kbps, Case 1

These figures indicate that an increase of approximately 3 dB in performance is obtained at a 1% BLER through the use of a 80ms TTI rather than a 20ms TTI.

5.3 Performance using new functionality

5.3.1 The effect of Time Switched Transmit Diversity

Time Switched Transmit Diversity (TSTD) is currently not supported for S-CCPCH within HCR TDD release 5 specifications. The performance impact of the introduction of TSTD to S-CCPCH is addressed in this section in respect of MBMS services.

Figures 5.3.1 to 5.3.6 indicate the effect of time switched transmit diversity for data rates of 32 kbps, 64 kbps and 128 kbps, and for a TTI length of 20 ms and 80ms.

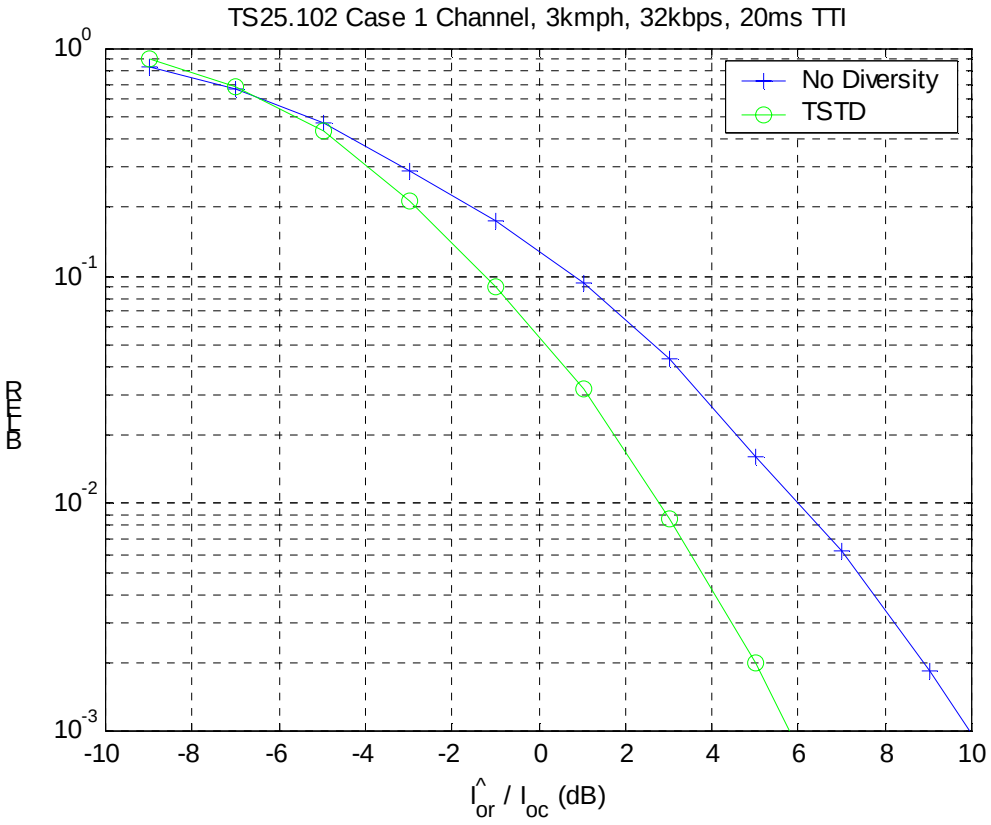

Figure 5.3.1: BLER versus Tx Diversity, 20ms TTI, 32 kbps, Case 1

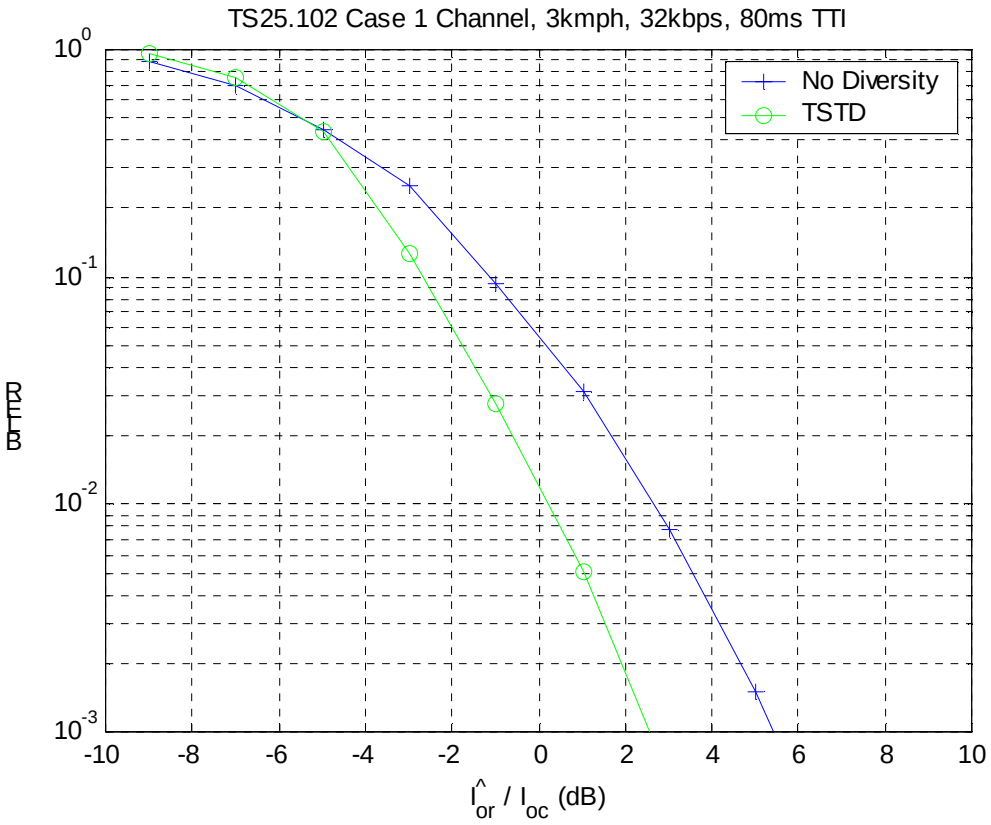

Figure 5.3.2: BLER versus Tx Diversity, 80ms TTI, 32 kbps, Case 1

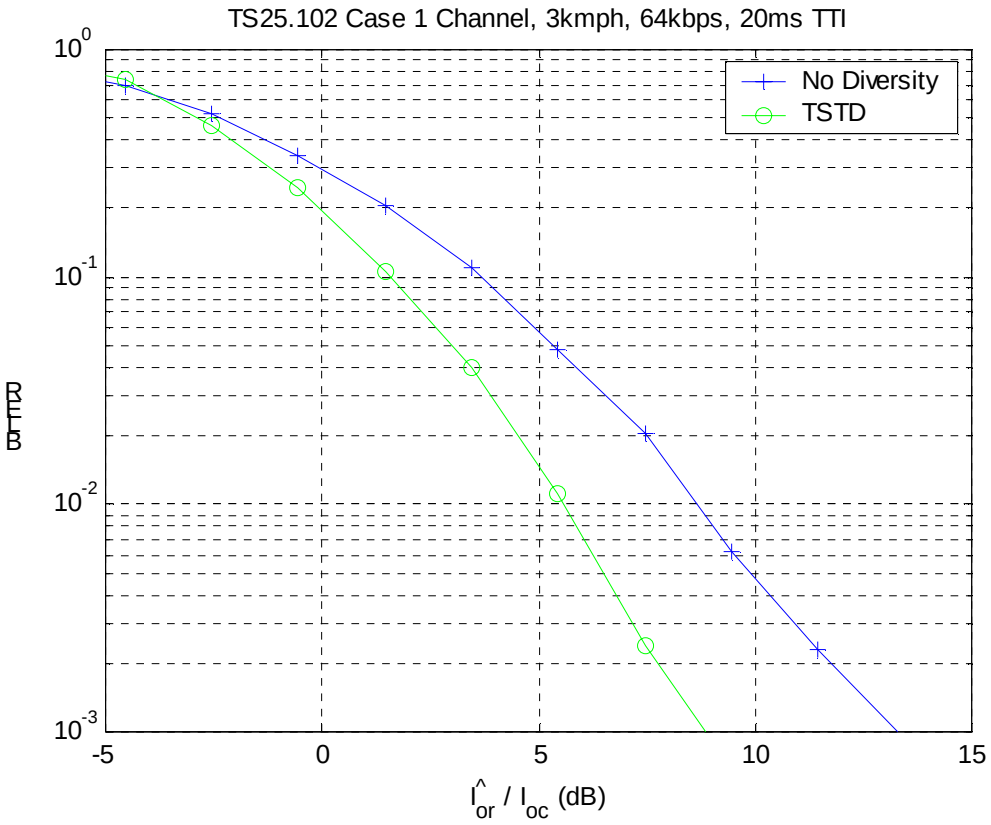

Figure 5.3.3: BLER versus Tx Diversity, 20ms TTI, 64 kbps, Case 1

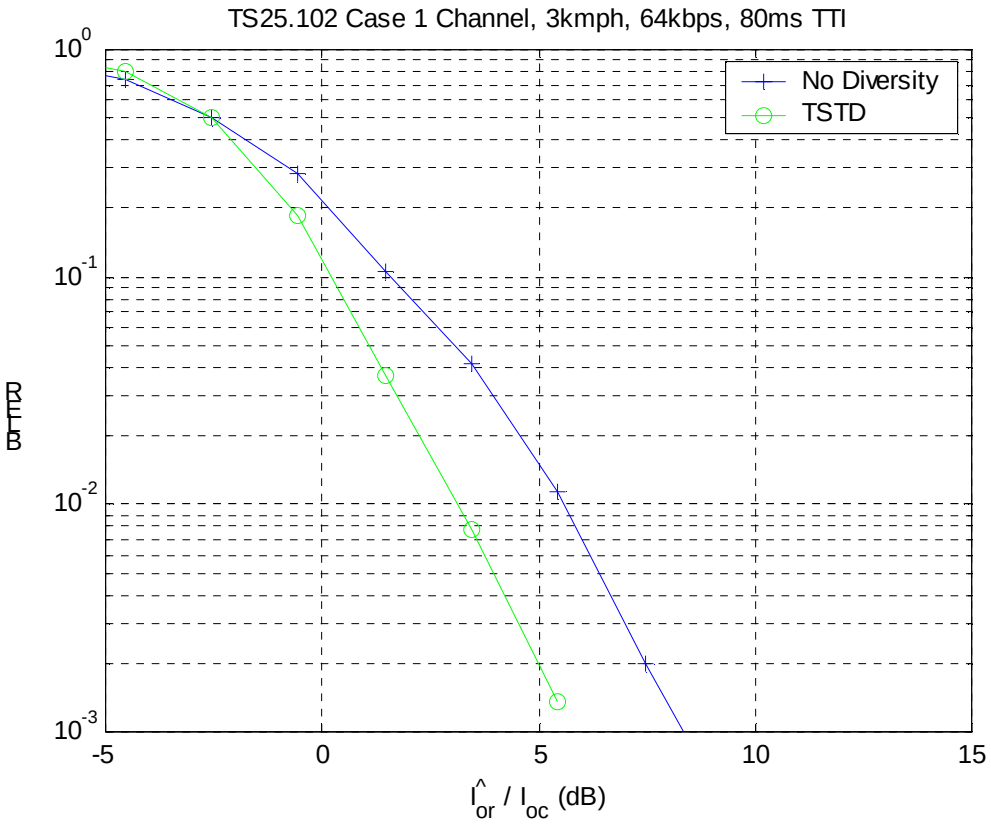

Figure 5.3.4: BLER versus Tx Diversity, 80ms TTI, 64 kbps, Case 1

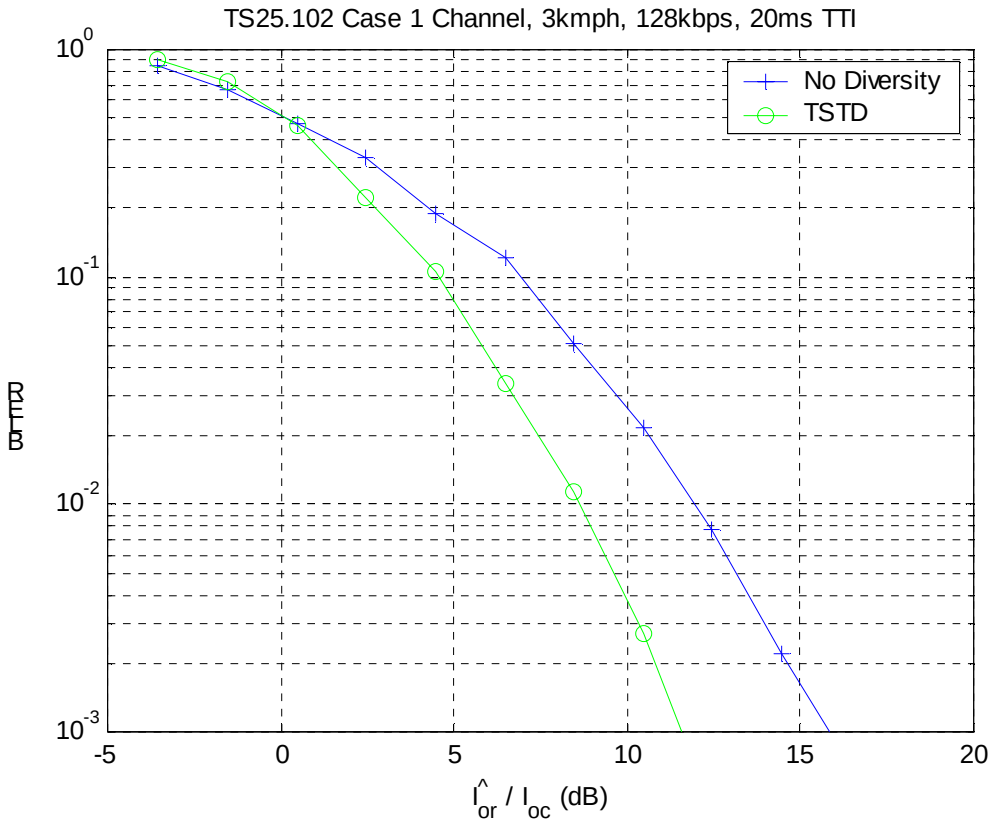

Figure 5.3.5: BLER versus Tx Diversity, 20ms TTI, 128 kbps, Case 1

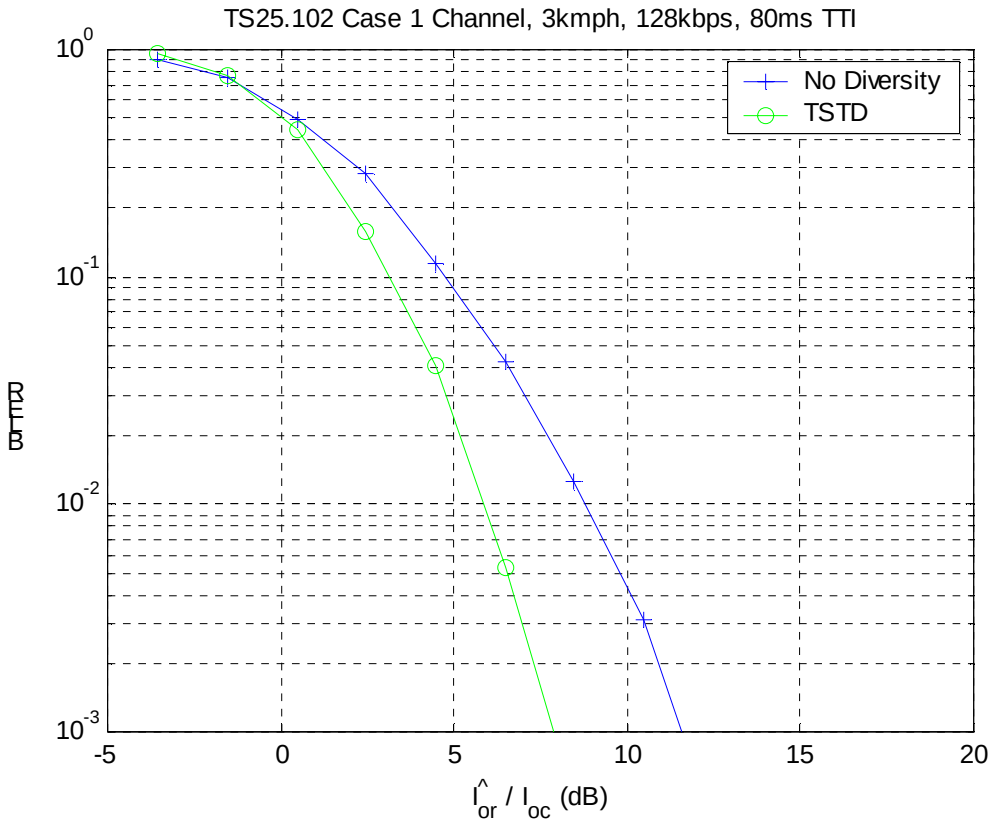

Figure 5.3.6: BLER versus Tx Diversity, 80ms TTI, 128 kbps, Case 1

These figures indicate that an increase of approximately 3 dB in performance is obtained at a 1% BLER through the use of time switched transmit diversity compared to no transmit diversity.

5.4 Summary

This section provides a summary of the results for the TS25.102 Case 1 multipath channel at 3kmh. Table 5.4.1 shows the $\hat{I}_{or}/I_{oc}$ required to achieve a 1% S-CCPCH BLER.

Table 5.4.1: Required $\hat{I}_{or}/I_{oc}$ for 1% BLER – Case 1

Data rate	TTI	$\hat{I}_{or}/I_{oc}$ for 1% BLER	
		No TSTD	TSTD
32 kbps	20ms	6.0 dB	2.8 dB
32 kbps	80ms	2.6 dB	0.2 dB
64 kbps	20ms	8.7 dB	5.6 dB
64 kbps	80ms	5.6 dB	3.1 dB
128 kbps	20ms	12.0 dB	8.6 dB
128 kbps	80ms	8.8 dB	5.8 dB

6 S-CCPCH performance for 1.28 Mcps TDD

6.1 Simulation assumptions

Table 6.1.1 presents simulation assumptions that have been used in deriving the performance estimates described in this chapter.

Table 6.1.1: Simulation parameters

Parameter	Assumption
Cellular layout	Hexagonal Grid
Re-use pattern	3
Propagation law	128.1-37.6log10(R)
Service, Bit rate	64, 32kbit/second, Data
FEC coding	Turbo
Transport Block Size	1280, 640; 16 bit CRC
TTI	20, 80 ms
Spreading Factor	16
MBMS timeslots per base station	1
Ec/Ior in the MBMS timeslot	0 dB
Slot Format	No TPC, TFCI, SS
Power Control	None
Channel Estimation	Enabled - Realistic
Receiver Detection	JD-MMSE
Multipath Channels	Multipath case 1 as defined in TS25.102
Carrier Frequency	2000 MHz
UE Speed	3km/h

The 3GPP case 1 channel model has been used in these link level simulations as it represents one of the more challenging propagation conditions in terms of achieving useful block error rates in a wide coverage area.

The simulations have been based upon each base station allocating one timeslot for MBMS, in which full power is transmitted for the MBMS service. Therefore the base station resource requirements are stated in terms of the fraction of bandwidth used for MBMS, rather than the fraction of base station power as is the case for FDD.

6.2 Performance using Release-5 functionality

The effects of two main parameters available in Release-5 on S-CCPCH performance have been investigated:

- TTI length (In Release 5, the TTI on FACH may be varied between 10 ms and 80 ms)
- Transmit diversity
  - SCTD
  - TSTD

In the following sections, the results of simulation campaigns aimed at establishing MBMS performance and coverage limits are presented.

6.2.1 The effect of TTI length on MBMS performance

Figures 6.2.1 and 6.2.2 indicate the effect of increasing the TTI length from 20 ms to 80 ms for data rates of 32 kbps and 64 kbps.

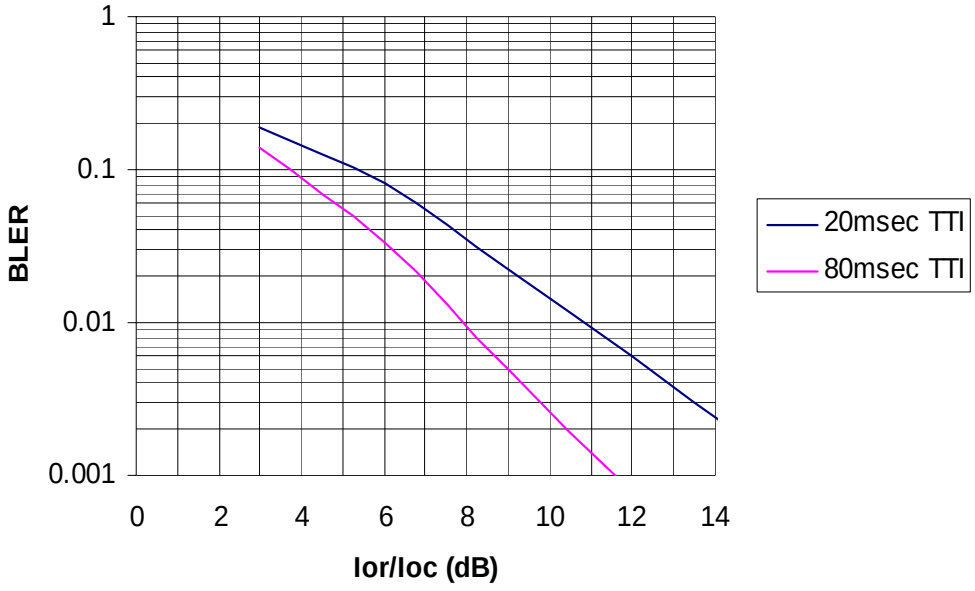

Figure 6.2.1: Performance improvement obtained by means of lengthening the TTI for MBMS 32 kbps

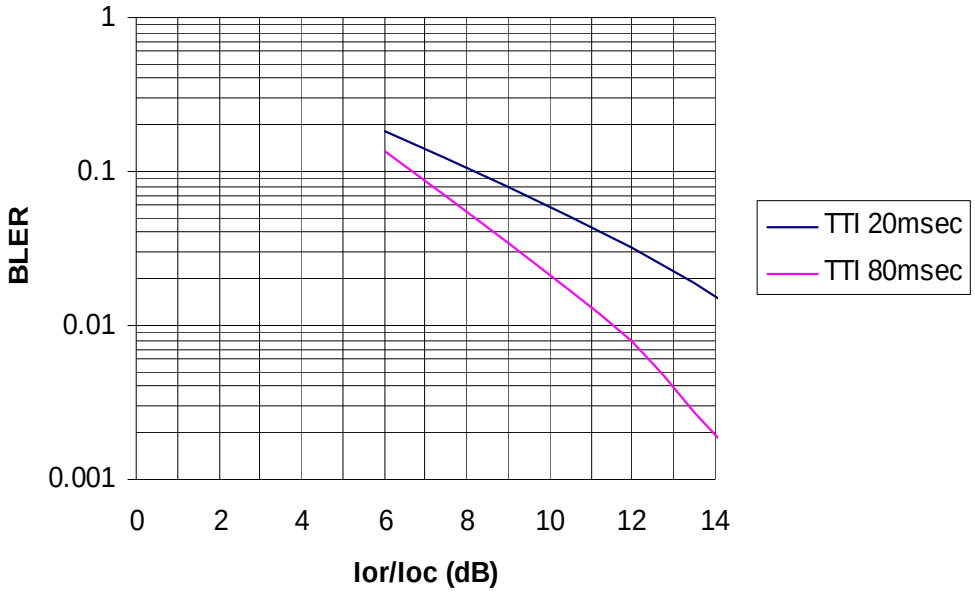

Figure 6.2.2 Performance improvement obtained by means of lengthening the TTI for MBMS 64 kbps

The figures indicate a gain of around 3 dB at BLER of 1% can be obtained by moving to the longer TTI length.

6.2.2 The effect of open loop transmit diversity on MBMS performance

In Release 5, two types of open loop transmit diversity are available for S-CCPCH; TSTD and SCTD. Figures 6.2.3 to 6.2.6 indicate the effect of open loop transmit diversity on 32 and 64 kbps MBMS services.

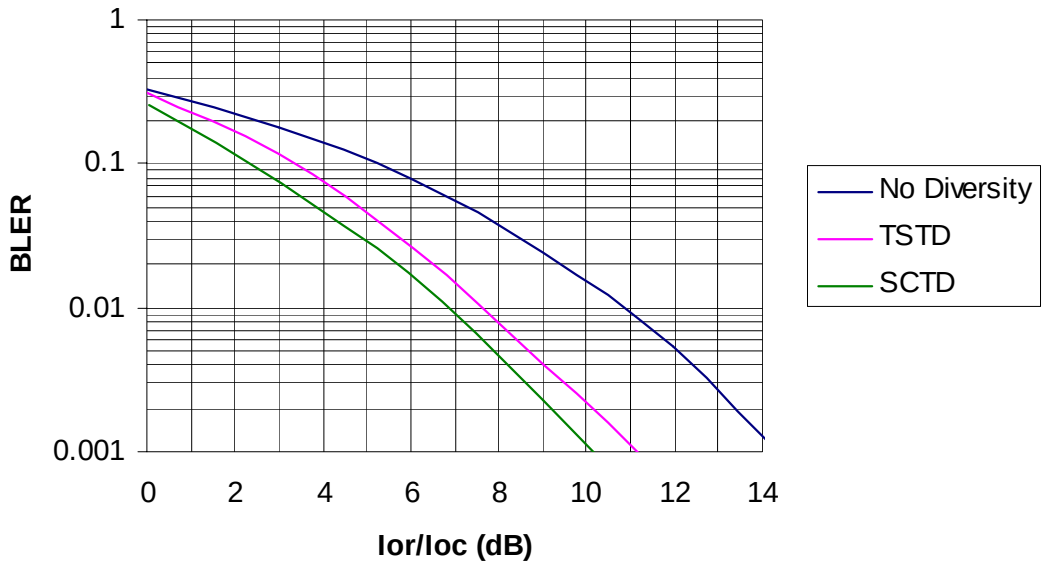

Figure 6.2.3 Open Loop Transmit Diversity performance for 32 kbps MBMS service with TTI = 20 ms

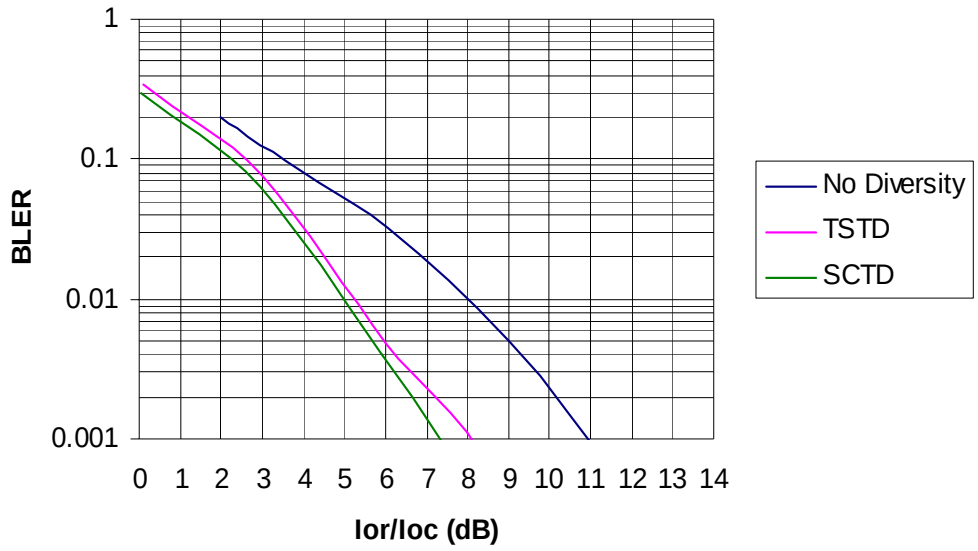

Figure 6.2.4 Open Loop Transmit Diversity performance for 32 kbps MBMS service with TTI = 80 ms

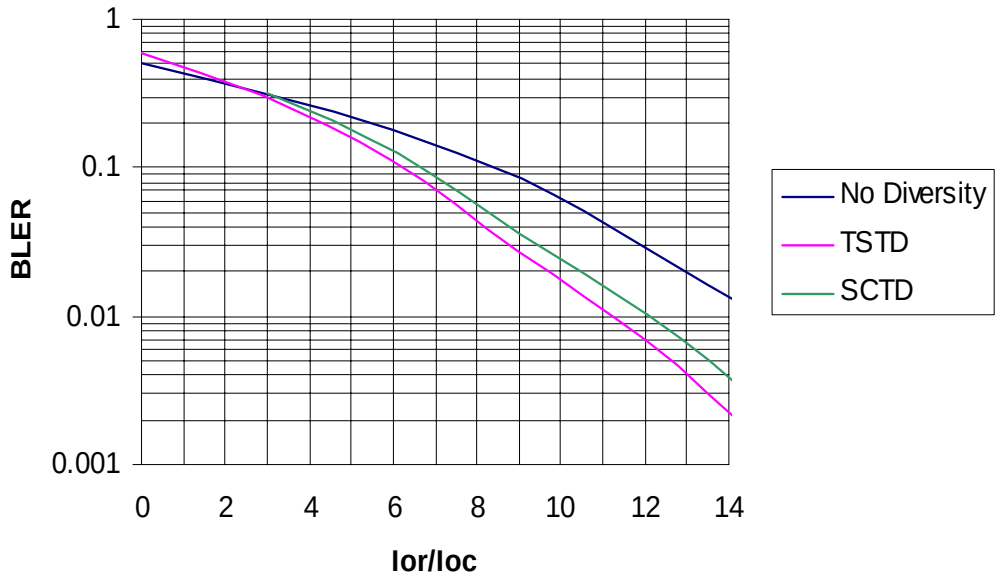

Figure 6.2.5 Open Loop Transmit Diversity performance for 64 kbps MBMS service with TTI = 20 ms

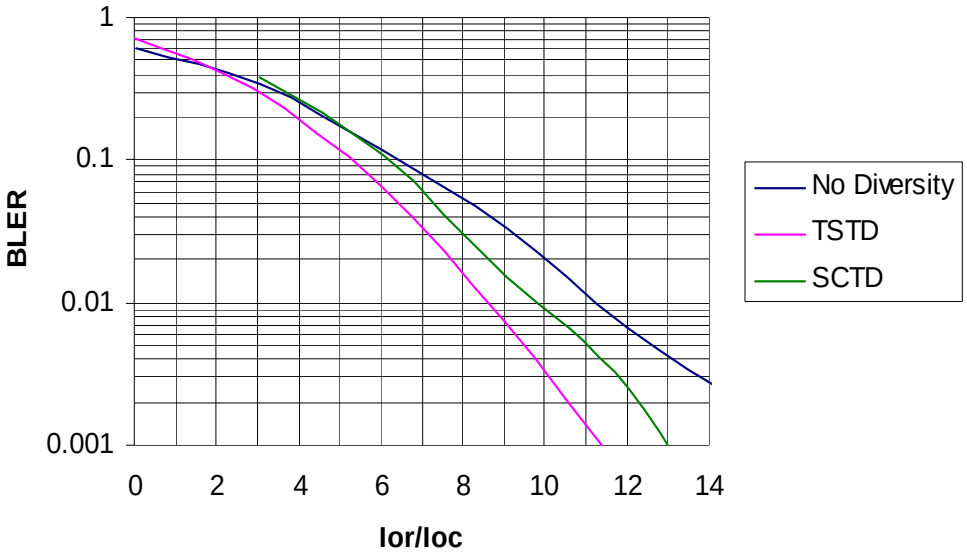

Figure 6.2.6 Open Loop Transmit Diversity performance for 64 kbps MBMS service with TTI = 80 ms

The figures indicate a gain of around 3 dB, at BLER 1%, in addition to the gain that can be obtained by lengthening the TTI. At 32 kbps, SCTD appears to be the better choice for transmit diversity, whilst at 64 kbps, TSTD is marginally better. It should be noted that SCTD at 64 kbps requires a higher degree of puncturing compared to TSTD due to the finite amount of available codes.

6.2.3 Coverage estimates for MBMS services using 1.28 Mcps TDD

Estimates of average cell coverage have been obtained using a simple, interference limited system level model, based on the case 1 link level results. A 3 carrier deployment has been assumed, resulting in a total allocated bandwidth of 5MHz. Re-use patterns of 3, 4 and 7 relate to 14%, 20% and 33% respectively of this bandwidth when the MBMS service is transmitted using a dedicated timeslot in each cell.

Table 6.2.1: Achievable cell coverage at 1% BLER for 64 kbps and 32 kbps MBMS services, when the re-use pattern is 3

	32 kbps MBMS		64 kbps MBMS	
	TTI 20 ms	**TTI 80 ms**	**TTI 20 ms**	**TTI 80 ms**
No Diversity	72%	83%	57%	71%
TSTD	84%	91%	71%	81%
SCTD	86%	95%	69%	76%

Table 6.2.2: Achievable cell coverage at 1% BLER for 64 kbps and 32 kbps MBMS services, when the re-use pattern is 4

	32 kbps MBMS		64 kbps MBMS	
	TTI 20 ms	**TTI 80 ms**	**TTI 20 ms**	**TTI 80 ms**
No Diversity	79%	87%	65%	77%
TSTD	88%	94%	78%	86%
SCTD	90%	97%	76%	81%

Table 6.2.3: Achievable cell coverage at 1% BLER for 64 kbps and 32 kbps MBMS services, when the re-use pattern is 7

	32 kbps MBMS		64 kbps MBMS	
	TTI 20 ms	**TTI 80 ms**	**TTI 20 ms**	**TTI 80 ms**
No Diversity	91%	95%	82%	90%
TSTD	96%	98%	90%	95%
SCTD	96%	99%	89%	93%

6.3 Performance using new functionality

6.4 Summary

The following worst case performance bounds are drawn from the data:

- When Open Loop Transmit Diversity is not available or not employed, in excess of 33% of the 5MHz bandwidth (i.e. one carrier) is required for achieving 90% coverage for 64 kbps. For 32 kbps, 20-33% is required.
- When Open Loop Transmit Diversity is not available or not employed and around 20% of the bandwidth is used for MBMS, around 75% coverage can be achieved with 64 kbps, or just under 90% for 32 kbps.
- When SCTD is employed, 95% coverage can be achieved with 32 kbps using 14% of the bandwidth
- When TSTD is employed, 95% coverage can be achieved with 64 kbps using 33% of the bandwidth (i.e. one carrier)

Annex <A>: Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
26/08/03	R1#33	R1-030675			Outline agreed	0.0.0.	0.0.1
11/09/03	R1#33	R1-030676 R1-030881 R1-030882 R1-030883 R1-030944			Inclusion of text proposals covering S-CCPCH power requirements using Release-5 physical layer functionality.	0.0.1	0.0.2
12/09/03	R1#33	R1-030950			Removal of revision marks	0.0.2	0.1.0
16/09/03	RP#21	RP-030535			Presented to RP #21 for information	0.1.0	1.0.0
08/10/03	R1#34	R1-031116 R1-031015			Inclusion of text proposals improving the presentation of results for FDD and update of results for FDD Ped-A 3 kmh.	1.0.0	1.1.0
24/11/03	R1#35	R1-031294			Inclusion of results for 3.84 Mcps TDD.	1.1.0	1.1.1
24/11/03	R1#35	R1-031357 R1-031371			Clarification of the applicability of some channel models and inclusion of text proposal on coverage aspects for FDD.	1.1.0	1.1.1
24/11/03	R1#25	Editor			Clean up of table & figure numbering & formatting.	1.1.0	1.1.1
03/12/03	R1#25	R1-031413			Approved with minor editorial corrections	1.1.1.	1.2.0