TSG-RAN Working Group 1 meeting#15 ***TSGR1(00)1022***

Berlin , Germany, Aug 22 ~ 25, 2000

Agenda Item: AH21
Source: CWTS
To: TSG RAN WG1
Title: Modulation for 1.28Mcps TDD
Document for: Discussion and Approval

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1 Summary

In the 1.28Mcps TDD, 8PSK modulation is used for high data rate services ,so in addition to QPSK , more description about 8PSK should be given ,

2 Proposal

This document is proposed to cover the additional features of 1.28Mcps TDD modulation. It is proposed to discuss and include the following text proposal into working CR of TS25.223.

---------- Changes to working CR of 25.223 begin ----------

4 General

In the following, a separation between the data modulation and the spreading modulation has been made. The data modulation for 3.84Mcps TDD is defined in clause 5,the data modulation for 1.28Mcps TDD is defined in clause 6 and the spreading modulation in clause 7.

Table 1: Basic modulation parameters

Chip rate	same as FDD basic chiprate: 3.84 Mchip/s	Low chiprate: 1.28 Mchip/s
Data modulation	QPSK	QPSK , 8PSK
Spreading characteristics	Orthogonal Q chips/symbol, where $Q = 2^p$, $0 <= p <= 4$	Orthogonal Q chips/symbol, where $Q = 2^p$, $0 <= p <= 4$

6 Data modulation for 1.28Mcps TDD

6.1 Symbol rate

The symbol duration TS depends on the spreading factor Q and the chip duration TC: Ts = Q × Tc, where Tc = $\frac{1}{chiprate}$.

6.2 Mapping of bits onto signal point constellation

6.2.1 QPSK modulation

The mapping of bits onto the signal point constellation for QPSK modulation is the same like in the 3.84Mcps TDD cf. [5.2.1 Mapping for burst type 1 and 2].

6.2.2 8PSK modulation

The data modulation is performed to the bits from the output of the physical channel mapping procedure.In case of 8PSK modulation 3 consecutive binary bits are represented by one complex valued data symbol. Each user burst has two data carrying parts, termed data blocks:

$$\underline{\mathbf{d}}^{(k,i)} = (\underline{d}_1^{(k,i)}, \underline{d}_2^{(k,i)}, ..., \underline{d}_{N_k}^{(k,i)})^T \quad i = 1, 2; k = 1, ..., K. \tag{1}$$

N_k is the number of symbols per data field for the user k. This number is linked to the spreading factor Q_k.

Data block $\underline{\mathbf{d}}^{(k,1)}$ is transmitted before the midamble and data block $\underline{\mathbf{d}}^{(k,2)}$ after the midamble. Each of the N_k data symbols $\underline{d}_n^{(k,i)}$; i=1, 2; k=1,...,K; n=1,...,N_k; of equation 1 has the symbol duration $T_s^{(k)} = Q_k . T_c$ as already given.

The data modulation is 8PSK, thus the data symbols $\underline{d}_n^{(k,i)}$ are generated from 3 consecutive data bits from the output of the physical channel mapping procedure:

using the following mapping to complex symbols:

Consecutive binary bit pattern	complex symbol
$b_{1,n}^{(k,i)}\ b_{2n}^{(k,i)}\ b_{3n}^{(k,i)}$	$\underline{d}_n^{(k,i)}$
000	cos(11pi/8)+ jsin(11pi/8)
001	cos(9pi/8)+ jsin(9pi/8)
010	cos(5pi/8)+ jsin(5pi/8)
011	cos(7pi/8)+ jsin(7pi/8)j
100	cos(13pi/8)+ jsin(13pi/8)
101	cos(15pi/8)+ jsin(15pi/8)

110	cos(3pi/8)+ jsin(3pi/8)1
111	cos(pi/8)+ jsin(pi/8)

The mapping corresponds to a 8PSK modulation of the interleaved and encoded data bits $b_{l,n}^{(k,i)}$ of the table above and $\underline{d}_n^{(k,i)}$ of equation 1.

---------- Changes to working CR of 25.223 end ----------