TSG-RAN Working Group 1 (Radio) meeting #6 ***TSGR1#6(99)875***
Espoo, Finland, 13-16 July 1999

Agenda Item : WG1

Source : Shinsegi Telecomm, Inc.,

Title : Performance Improvement of DPDCH by using ECPM (Enhanced Code Position Modultion) cell search scheme.

Document for : Discussion

---

1. Introduction

In the last Cheju meeting, we proposed Enhenced CPM (ECPM) [3] and presented the cell search performance of ECPM schem compared to that of current 3GPP scheme. ECPM scheme has the performance gain of almost 3 dB and memory requirement reduction of up to 95% and memory read/write requirement reduction of up to 98% and 2nd step add/comp operation reduction of up to 95% when compared to current 3GPP cell search scheme. Since ECPM schem transmit only 4 code signals per frame its instantaneous power is 2 times current 3GPP cell search scheme for the same cell search performance. There was one comment that this instantanious power may cause peak-to-average ratio. But that problem can be overcome by using power reductiom of DPDCH channel at the SCH code position. And this can be simply implemented by using digital gain control in the base band domain.
Also, this power reduction of transmitted power for DPDCH at the corresponding SCH code position results in better DPDCH BER performance than current 3GPP SCH and DPDCH relation.

2. Simulation Model

We have done the simulation by using SPW. The followings are simulation conditions.

- 1/3 convolutional code with block interleaver
- Data rate for reference user : 162.4 kbps
- CQPSK spreading and QPSK data modulation
- No oversampling
- 60 km/hr vehicle speed (111 Hz Doppler)
- Pilot Symbol based channel estimation

Figure 1 shows simulation channel model. Here we assumed P_S/P_A as 0.1 for 3GPP, 0.2 for ECPM and Figure 2 shows schematic digram of traffic channel reduction for ECPM scheme.

Figure 1. Simulation channel model

Figure 2. Down link structure for both schemes

3. Simulation Results

We have done simulations when the P_A/N is 0 dB, 10 dB and 20 dB. This value reflect the mobile distance from the cell site, that is, 0dB case is when the mobile is located at the cell boundary and 20 dB case is when the mobile is located near the cell cite. In this simulation, we have shown the BER performance by varying the P_D/P_A for each case. Figure 3, 4 and 5 show the simulation results for each case.

Figure 3. Comparison of BER performance when P_A/N is 0 dB

Figure 4. Comparison of BER performance when P_A/N is 10 dB

Figure 5. Comparison of BER performance when P_A/N is 20 dB

4. Conclusions

In this contribution, we have shown that the ECPM has even better DPDCH BER performance when we reduce DPDCH traffic power by the amount of SCH power. This reduction can be option for each Base station manufacturer who have difficulties in managing PAR (Peak to Average Ration) of HPA.

The followings are conclusions.

- ECPM scheme can overcome PAR problem by using power reducing of DPDCH at the SCH code position.
- Simulation results show that despite power reducing, with ECPM scheme, the BER performance of DPCH is better.
- More important thing is the complexity of UE. As mentioned at TSGR1#5(99)659, the receiver complexity of ECPM scheme is much less than current 3GPP 2 SCH scheme.
- The receiver of ECPM scheme is very flexible for multi-chip rate.

References

[1] “CPM based Fast Cell Search Algorithm”, Tdoc SMG2 UMTS-L1 634/98, Dec..14-18, Shinsegi Telecomm. Inc., Espoo, Finland

[2] “CPM based Fast Cell Search Algorithm:Link level simulation results”, Tdoc SMG2 UMTS-L1 006/99, Jan..18-20, Espoo, Finland

[3] “Performance and Comparison of Ehnanced CPM and Current 3GPP Cell Search Schemes”, TSGR1#5(99)659, Cheju, Korea, Jule 2-4, 1999.