

二維分頻多工分碼多重接取系統之設計

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摘要

因應未來無線通訊系統提供影像、寬頻數據等多媒體服務的趨勢，高資料傳輸速率的傳輸技術成為近年來熱門的研究。結合分碼多工接取及正交分頻接取技術的多載波分碼多工擷取系統，雖具有兩種接取技術的優點，但僅能在時域或頻域進行展頻，因此在無線資源的應用上較無彈性。因此在本論文中，我們提出適應性二維分頻多工分碼多重接取系統，該系統可結合時域、頻域及編碼空間的使用，使得無線資源的利用更有彈性與效率。再者，我們在該系統中並考量時域、頻域的展頻碼長度、子載波配置、展頻碼的選擇以及接收端的結合策略，進行具有資源使用效率的系統設計。另外我們也針對二維展頻系統提出低複雜度的多用戶偵測技術，再者，考慮不同的使用者人數與通道狀況，提出我們對該系統的設計準則。最後並藉由系統模擬的程序，證實適應性二維分頻多工分碼多重接取系統比一維多載波分碼多工接取系統有更好的效能表現與系統資源分配。

On the Design of 2-D OFDM-CDMA Systems

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The logo of National Chiao Tung University is a circular emblem. It features a central shield with a book and a torch, surrounded by the university's name in Chinese and English. The year '1996' is visible at the bottom of the shield. The word 'Abstract' is overlaid on the logo in a bold, black font.

Abstract

In the future, multimedia communications will be the main stream of wireless communication systems and realizing effective high data rate physical layer transmission becomes a new challenging research. Recently, some new transmission methods called Multi-carrier CDMA systems based on the combination of code division multiple access (CDMA) and orthogonal frequency division multiple access (OFDM) are proposed. Although these systems have advantages from OFDM and CDMA but lose flexibility due to just spreading in the frequency or time domain. In the thesis, we propose an adaptive 2-D OFDM-CDMA systems for the forward link to obtain more flexible and efficient resource utilizations by making finer partition of system resource into time, frequency, and code domain. Some design issues including the combinations of time and frequency spreading patterns, sub-carrier allocation methods, spreading code assignment for simultaneous users, and the diversity combining schemes are jointly considered in our research. Furthermore, the lower complexity multi-user detectors for 2-D OFDM-CDMA systems are investigated. Proposed adaptive 2-D OFDM-CDMA systems exhibit better performance by simulation results and finally we give the suggestions for the optimal design.

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