數位音訊廣播、數位視訊廣播及無線都會區域網路 IEEE 802.16a 之同步機制研究設計

學生：紀育婷　　　　　　　　　指導教授：陳紹基 博士

國立交通大學

電子工程學系　電子研究所碩士班

摘　　要

本篇論文的目的在設計數位音訊廣播、數位視訊廣播及 IEEE 802.16a 下行的同步系統。在這些系統中,我們皆用最大相似估測法來估測 OFDM 符元開始的時間及小數頻率偏移。在數位音訊廣播中,框位開始的判斷是利用兩個滑動的窗口計算接收的能量以偵測空白符元的到來。在頻域使用相位參考符元的差值編碼匹配估測整數的頻率偏移。在數位視訊廣播中,利用兩個符元的連續嚮導載波來估測整數的頻率偏移,藉由傳送參數訊號的 1-16 位元來估測框位。在 IEEE 802.16a 下行系統中,利用在頻域上的差值編碼判斷框位開始的時間及整數的頻率偏移。我們針對加入性白色高斯雜訊及多路徑通道來模

擬分析同步的效能，結果顯示本論文所探討及提出之方法效果良好。

Synchronization Schemes for DAB, DVB-T and IEEE 802.16a Systems

Student: Yu-Ting Chi   Advisor: Dr. Sau-Gee Chen

Department of Electronics Engineering &

Institute of Electronics

National Chiao Tung University

ABSTRACT

The goal of this research is to design synchronization schemes for Eureka 147 DAB, DVB-T, and IEEE 802.16a DL TDD systems. We apply the maximum likelihood criterion to the estimations of symbol timing and fractional frequency offset for all these three systems. For Eureka DAB 147, the frame synchronization is done by exploiting two sliding windows to calculate energy and then detect null symbol. The integral frequency offset can be estimated after FFT by a differential matched filter using PRS. For DVB-T, the integral frequency synchronization is done by exploiting the continual pilots of two symbols in the frequency domain. Frame detection is done by matching the 1~16 bits of TPS. For IEEE 802.16a DL, the fixed-location pilots are used to estimate integral frequency and frame start. The performances of proposed methods are examined in both AWGN channel and multipath channel. Simulation results show that the investigated and proposed methods are effective in achieving the required synchronizations tasks.