

# Best Efficiency of DVB-T Broadcast Station

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## ABSTRACT

The video and audio compress technique was improved fast from 1990, many practicality and innovatively communication products changed human habit. The high-resolution digital television systems was overcome transmission bandwidth also, this great technique make television history rewrite and from a analogue television system into a digital television century. At the same resource, digital television systems provide more function than analogue television system, like high-resolution pictures, dynamic sound tracks and interactive services. Terrestrial digital television systems is differ from cable television system, most terrestrial digital television programs is free to air, and suit for mobile reception, this is cable television systems can't be. Therefore, terrestrial digital television systems are potential in the feature. The terrestrial digital television transmitted in UHF band in Taiwan, at this reason, must build many transmit station around the services area. If not evaluate about location and equipments, may waste capital and time for nothing. Therefore, how to use the economy and Efficiency methods to plan a transmit station that is the challenges of communication engineers.

Keywords : Digital television ; Digital communication ; Terrestrial broadcast

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## REFERENCES

- [1] ETSI EN 300 744 V1.4.1, “Digital Video Broadcasting (DVB);Framing structure, channel coding and modulation for digital terrestrial television”, 2001.01 [2] 電視學會, “我國地面數位電視廣播傳輸標準建議書”, 2001.05.10 [3] ETSI TR 101 290 V1.2.1, “Digital Video Broadcasting (DVB);Measurement guidelines for DVBsystems”, 2001.05, Page 123 [4] 林志星, “數位電視地面廣播原理與商機”, 2002.3.
- [5] Jerry Whitaker “DTV Handbook:The Revolution In Digital Video” Third Edition, 2001 [6] 林志星、林瑞榮、林訓、楊鴻榮, “數位電視地面無線廣播原理與應用”, 1998.12.15 [7] Ove Edfors,Magnus Sandell,Jan-Jaap van de Beek,Daniel Landstrom,Frank Sjoberg, “Anintroduction to orthogonal frequency-division multiplexing”, 1996.09 [8] 曹晨、楊作梅, “數字電視技術:高清晰度數字視頻原理與應用”, 2002.1 [9] 林志星, “台視九十一年度七月份在職訓練報告:DVB—SFN 技術探討”, 2002.7.
- [10] Walt Husak, Charles Einolf, and Stan Salamon “On-Channel Repeaters for Digital Television Implementation and Testing” 1999.08 [11] 電子工程專輯, “兩大數位電視廣播制式的基本技術、性能比較和競爭趨勢”, <http://www.ee.com/> [12] 李光球, “MR64QAM/OFDM 傳輸系統中的非線性分析”, 上海交通大學學報No.1, 1999 [13] Erik Stare, “High speed mobile DVB-T reception in SFNs using the 8K mode”. Teracom R&DDepartment, 2000.11.08 [14] Imed Ben Dhaou and Laszlo Horvath, “Performance analysis and low power VLSI implementation of DVB-T receiver”, Royal Institute of Technology, 1999.03.04 [15] 電視學會, “中部火炎山地區數位發射電波涵蓋實測報告”, 2002.05 [16] Ingo Gaspard, “Mobile Reception of The Terrestrial DVB-System”, IEEE, 1999 [17] 林南榮, “台視八十九年度三月份在職訓練報告:數位電視之全球發展”, 2000.03 [18] 電視學會, “92年計畫案”, 2003.03 [19] 楊永旺, “台視九十一年度七月份在職訓練報

告:火炎山數位電視廣播”,2002.07 [20] Baseline Digital Terrestrial TV Receiver Specification”, Technical Report Number TR-030 version 1.0,2000.02.13 [21] 呂照陽、陳朝陽、李正雄、張紹粕、楊天助,“北部地區數位電視廣播電波涵蓋實測報告”,電視學會聯合辦公室,2001.12 [22] 楊鴻榮,“台視九十二年度二月份在職訓練報告:北部地區數位場強實測與發射天線規劃”,2003.02