# Dedication

**To my eyes, which see life**

**To my parents ... ... ... ... ... ... ... ... … … … … …**

**All thanks and appreciation and respect for those who helped me step by step to success**

**To my brothers and sister … … … … … … … …**

**To all teach me to each of the characters**

**To my teachers … … … … … … … … … … … ...**

# Acknowledgement

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# Abstract

The goal of this work is to produce algorithm for coexistence in TVWS between 802.22 and 802.11 by equal opportunity without reduce in the delay time and throughput for each of them. Also, we investigate the coexistence problem between the 802.22 and the 802.11af systems in the TV White Spaces (TVWS). 802.22 And 802.11af are two typical standards envisioned to be widely adopted in the future. However, these two standards are heterogeneous in both power level and PHY/MAC design, making their coexistence challenging. We focus on the design of a co-channel coexistence scheme for the 802.22 customer-premises equipments (CPE) and the 802.11af systems. In this work, we identify the challenges to enable the co-channel coexistence of the 802.22 and the 802.11af systems and then propose algorithm depend of frame times. We apply the algorithm in two networks in three cases depending of amount of transmitting data .we find this propose solution increased the throughput and decrease the waiting time by a notable way for 802.11.

# المستخلص

الهدف من هذا العمل هو انتاج خوارزميه للتعايش بين ال 802.11 وال802.22 فى مجال الترددات الجديد وهو فراغ التلفزيونات الابيض بطريقه متساويه من غير تقليل زمن الانتظار والانتاجيه لكل منهمه. ايضا نقدم مشكله التعايش بين هذين الشبكتين فى فراغ التلفزيونات الابيض. ال80.22 وال802.11 هما من اكثر الشبكات المستعمله حاليا وستستعمل فى المستقبل. لكن كل من هذين الشبكتين متجانسين فى مستوى الطاقه وفى تصميم الطبقات هذا يجعل التعايش تحدى. سنركز فى تصميم تقنيه التعايش باشتراك القنوات بالنسبه لاجهزه ومبانى المستهلكين لل802.22. فى هذا العمل سنعرف التحديات لنسمح للتعايش للقنوات المشتركه بين ال802.11 وال802.22 بعد ذلك سنقترح خوارزميه تعتمد على زمن الاطار وسنقوم بتطبيق الخوارزميه على كل من الشبكتين فى ثلاثه حالات اعتمادا على كميه البيانات المرسله. سنجد ان الخوارميه المقترحه زادت الانتاجيه وقللت زمن الانتظار بطريقه ملحوظه لل802.11.

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# List of Abbreviations

| | |
|---|---|
| AFH | Adaptive Frequency Hopping |
| AP | Access Point |
| BER | Bit Error Rate |
| BS | Base Station |
| BT | Busy Tone |
| CBP | Contention Beacon Protocol |
| CBT | Cooperative Busy Tone |
| CBT | Cooperative  Busy Tone |
| CCA | Clear Channel Assessment |
| CDIS | Coexistence Data Base and Information Server |
| CDMA | Code Division Multiple Access |
| CE | Coexistence Enabler |
| CHE | Cluster Head Equipment |
| CM | Coexistence Manager |

| | |
|---|---|
| CPE | Customer Premises Equipment |
| CSMA | Carrier Sense Multiple Access |
| CWNs | Cognitive Wireless Networks |
| Db | Decibels |
| DCS | Dynamic Channel Selection |
| DFS | Dynamic Frequency Selection |
| DSA | Dynamic Spectrum Access |
| DTV | Digital Television |
| DYSPAN-S | Dynamic Spectrum Access Network Standard Committee |
| ECMA | European Computer Manufactures Association |
| EDT | Energy Detection Threshold |
| FCC | Federal Communication Commission |
| FDMA | Frequency Division Multiple Access |
| FEC | Forward Error Correction |
| FFT | Fast Fourier Transform |
| FT | Frame Time |
| IEEE | Institute of Electrical and Electronics Engineers |
| ISM | Industrial, Scientific and Medical Band |

| | |
|---|---|
| LBT | Listen Before Talk |
| LDPC | Low Density Parity Check |
| LMSC | LAN/MAN Standard committee |
| MIMO | Multiple Input Multiple Output |
| ODFC | On Demand Frame Contention |
| OFDMA | Orthogonal Frequency Division Multiplexing |
| PHY/MAC | Physical/Media Access Control |
| QAM | Quadrature Amplitude Modulation |
| QPSK | Quadrature Phase Shift Key |
| RF | Radio Frequency |
| RS | Reed Solomon |
| SCH | Supper Frame Control Header |
| SE | Spectrum Etiquette |
| SWIFT | A split Wideband Interferer Friendly Technology |
| TDMA | Time Division Multiple Access |
| TG | Task Group |
| TPC | Transmit Power Control |
| TV | Television |

| | |
|---|---|
| TVWS | Television White Space |
| UHF | Upper High Frequency |
| USA | United States of America |
| VHF | Very High Frequency |
| WG | Working Group |
| WLAN | Wireless Local Area Network |
| WMAN | Wireless Metropolitan Area Network |
| WPAN | Wireless Personal Area Network |
| WRAN | Wireless Regional Area Network |
| WSDs | White Space Data Base |