多頻段天線模擬與設計 = Multiband antenna simulation and design

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摘 要

本篇論文設計了二款支援多頻段之天線，嚴格講起來，是採用同樣一種設計架構，設計出兩種不同尺寸之天線。這兩款天線設計架構是採用Print Dipole(印刷偶極)天線的設計方法，為求經濟、快速製作以及考慮成本低廉這三項因素，這二款天線都是以目前非常普遍之FR-4 玻璃纖維基板為材料，並考慮天線的特性盡可能將尺寸縮小化，以符合實用上之需求。 第二支天線為延續第一支天線之設計方法，以不流失太多天線特性為前提，將天線尺寸進行縮小化，這二款天線的不同點，為天線輻射銅箔迴路的形狀設計不同，進而產生尺寸縮小效果，終極目標主要都是期望所設計出來的天線所涵蓋頻帶範圍廣，適合目前市面上現有無線通訊系統之用途。 過程中，吾人不斷使用模擬軟體來調整天線輻射單元外型與尺寸，期望天線的特性能夠更為完美，以創作出更具有實用價值的天線，研究的目的是希望所設計出來之天線，日後能適用於未來整合多頻段的上網設備或通訊產品，如AP、ROUTER、小型區網基地台、無線電話…等設備，其天線頻段希望能涵蓋GSM 900MHz / PCS 1800 MHz / PHS 1900 MHz / CDMA 2100 MHz / WiFi 2.4GHz / WIMAX 2.5~2.7GHz 。 為了使設計的天線能夠使用於各個無線通訊系統，藉由調整輻射銅箔金屬面的長度與形狀，便可輕易使得天線產生之共振頻率，符合吾人所欲設計的頻段，以達成天線可以多頻段使用的目的。 在此要特別強調的是，此次設計天線涵蓋的頻段，計畫將2009年非常熱門的WiMAX 通訊系統的頻段2.5~2.7GHz頻段考慮在內，以便日後此天線也能馬上適用於WiMAX之通訊系統。天線設計方法是藉由將兩組對稱輻射體，以類似偶極天線型式直接印刷在玻璃纖維基板上，如此做法可以達到天線電路與基板容易結合，提昇製作上的便利性與降低製造成本，這也是本研究所期望達到的主要目的之一。

關鍵詞 : 印刷偶極子天線、多標準、無線聯網設備、WiFi、WiMAX FR-4、Zeeland IE3D 全波電磁模擬軟體、蜿蜒線路天線、反向蜿蜒線路天線

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