Studies of Compact Dual-Band Printed Antennas

許勝欽、許崇宜

E-mail: 9512752@mail.dyu.edu.tw

ABSTRACT

This thesis proposes two types of miniaturized dual-band printed-antenna designs. In the first antenna design, a pair of spur slots is embedded in the central circular patch of the annular-ring slot antenna to excite two frequency-separated resonant modes. One of the modes has a resonant frequency smaller than that of the reference antenna (without embedded spur slots) because the embedded slots have lengthened the electric current distribution on the central circular patch. Besides this achieved miniaturization objective, the radiation pattern in the second frequency band has been improved over the one without embedded slots in the sense that the cross-polarization level has been lowered. In the second antenna design, a composite metallic back-patch is added to a CPW-fed rectangular aperture. The back-patch consists of a circular patch and, outside of it, an annular-ring strip. Two resonant modes can be excited by adjusting the size of the circular patch and the relative position of the patch to annular-ring strip. The resonant band can be further lowered by creating a pair of notches in the outer portion of the annular-ring strip so as to miniaturize the antenna size.

Keywords : printed slot antennas ; dual-frequency operations ; compac

Table of Contents

REFERENCES

[1]IEEE Standard 802.11, “ Information Technology- telecommunications And Information exchange Between Systems- Local And Metropolitan Area Networks-specific Requirements-part 11: Wireless Lan Medium Access Control (MAC) And Physical Layer (PHY) Specifications, ” Nov. 1997.

[2]IEEE Standard 802.11a, “ Information Technology telecommunications and information exchange between systems-Local and metropolitan area networks - specific requirements. Part 11: wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: high-speed physical layer in the 5 GHz Band, ” 1999.

[3]IEEE Standard 802.11b, “ Information Technology-Telecommunications And Information Exchange Between Systems-Local And Metropolitan Area Networks- Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) And Physical Layer (PHY) Specifications: Higher-speed Physical Layer Extension In The 2.4 GHz Band, ” 1999.

[4]ETSI Standard TS 101 475, “ Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Physical (PHY) layer, ” Apr. 2000.
[5]IEEE Standard 802.11g, “ Information Technology- telecommunications and information exchange between systems-local and metropolitan area networks- specific requirements Part II: wireless LAN medium access control (MAC) and physical layer (PHY) specifications; Amendment 4: Further Higher Data Rate Extension in the 2.4 GHz Band, ” 2003.
[6]IEEE Standard 802.15.1, “ Information Technology-Telecommunications and information exchange between systems-Local and metropolitan area networks- Specific requirements Part 15.1: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Wireless Personal Area Networks (WPANs), ” 2002.
[7]IEEE Standard 802.15.4, “ Information Technology-Telecommunications and information exchange between systems-local and metropolitan area networks specific requirements part 15.4: wireless medium access control (MAC) and physical layer (PHY) specifications for low-rate wireless personal area networks (LR-WPANs), ” 2003.
[8]Lin, S. Y. and Wong, K. L., “ A Dual-Frequency Microstrip-Line-Fed Printed Slot Antenna, ” Microwave Opt. Technol. Lett., Vol. 28, pp. 373-375, July, 2001.
[9]Chen, J. S., “ Multi-Frequency Characteristics of Annular-Ring Slot Antennas, ” Microwave Opt. Technol. Lett., Vol. 38, pp. 506-511, Sep., 2003.
[10]Liu, J. C., Zeng, B. H., Wu, C. Y., and Chang, D. C., “ Double-Ring Slot Antenna with Tree-Shaped Coupling Strip for WLAN 2.4/5-GHz Dual-Band Applications, ” Microwave Opt. Technol. Lett., Vol. 47, pp. 374-379, Nov., 2005.
[11]Tehrani, H. and Chang, K., “ Multifrequency Operation of Microstrip-Fed Slot -Ring Antennas on Thin Low-Dielectric Permittivity Substrates, ” IEEE Trans. Antennas propagat., Vol. 50, pp. 1299-1308, Sep., 2002.
[12]Jang, Y. W., “ A Circular Microstrip-Fed Single-Layer Single-Slot Antennas for Multi-Band Mobile Communications, ” Microwave Opt. Technol. Lett., Vol. 37, pp. 59-62, Apr., 2003.
[13]Hsiao, H. M., Wu, J. W., Wang, Y. D., Lu, J. H., and Chang, S. H., “ Novel Dual-Broadband Rectangular-Slot Antenna for 2.4/5-GHz Wireless Communication, ” Microwave Opt. Technol. Lett., Vol. 46, pp. 197-201, Aug., 2005.
[14]Wu, J. W., “ 2.4/5-GHz Dual-Band Triangular Slot Antenna with Compact Operation, ” Microwave Opt. Technol. Lett., Vol. 45, pp. 81-84, Apr., 2005.
[15]Wu, Chen, W. S. and Wong, K. L., “ A Dual-Frequency Coplanar Waveguide-Fed Slot Antenna, ” Microwave Opt. Technol. Lett., Vol. 25, pp. 226-228, May, 2000.
[16]Chen, W. S. and Wong, K. L., “ Dual-Frequency Operation of a Coplanar Waveguide-Fed Dual-Slot Loop Antenna, ” Microwave Opt. Technol. Lett., Vol. 30, pp. 38-40, July, 2001.
[17]J. S. Chen, “ Dual-Frequency Slot Antennas Fed by Capacitively Coplanar Waveguide, ” Microwave Opt. Technol. Lett., Vol. 32, pp. 452-453, March, 2002.
[18]J. S. Chen and S. Y. Lin, “ Triple-frequency rectangular-ring slot antennas fed by CPW and microstrip line, ” Microwave Opt. Technol. Lett., Vol. 37, pp. 243-246, May, 2003.
[19]Chen, J. S., “ Multi-Frequency Characteristics of Annular-Ring Slot Antennas, ” Microwave Opt. Technol. Lett., Vol. 38, pp. 506-511, Sep., 2003.
[20]Chen, J. S. and Chen, H. D., “ Dual-Band Characteristics of Annular-Ring Slot Antenna with Circular Back-Patch, ” Electron. Lett., Vol. 39, pp. 487-488, March, 2003.
[21]Chen, J. S., “ Studies of CPW-Fed Equilateral Triangular-Ring Slot Coupled Patch Antennas, ” IEEE Trans. Antennas propagat., Vol. 53, pp. 2208-2211, July 2005.