Chapter 17
Antennas for Narrow Band IoT Appliances and Applications

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ABSTRACT

Radio frequency identification (RFID) antennas are used for wireless communication and in real-world applications. Now the internet of things (IoT) and automation have opened the doors to accomplish improved efficiency and productivity. Ultra-high frequency (UHF) RFID antenna is a kind of auto-identification method that recognizes, discovers, validates, and engrosses with other IoT devices to competently accomplish one or more tasks. UHF RFID antennas are one of the important termination components that are installed throughout plants, easing automation. These antennas are principally cast off in engineering atmospheres that necessitate enormous strength to grip impact, shock, vibration, and thermal shocks deprived of trading-off the RF performance. This chapter evaluates and deliberates numerous algorithms and methodologies meant to provide more elastic and well-organized traditions of analyzing RFID antennae.

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INTRODUCTION

Radio Frequency Identification (RFID) antenna system nowadays are widespread in wireless communication and real-world applications. This antenna used in numerous systems such as Personal Digital Assistant (PDA), Bluetooth systems, Wireless Local Area Networks (WLAN), railway vehicle identification, road tolling system, fish tracking systems, armed and individual communication system. Imminent developments in sensing and communication technologies have leveraged high visibility in the manufacturing process. Internet of Things (IoT) is a very significant automation process of various embedded computer systems, sensors such as the wireless sensor networks and control systems and automation where Automatic Identification and Data Capture (AIDC) is an integral part of it. The AIDC sensors are a. Optical sensors b. Digital sensors and c. wireless sensors. RFID tails about regular frequency ranges, which are low frequency (120 – 135 KHZ), High frequency (10 – 15 MHZ), Ultra-High Frequency (850 – 950 MHZ) and Microwave Frequency (2.45 GHZ). An Ultra-High Frequency (UHF) RFID system consists of three basic components such as (i) transponder (tag), (ii) interrogator (reader) (iii) antenna. The reader antenna is used to transmits and receives radio – frequency signals from a passive RFID tag. The Figure 1 show a typical UHF RFID system. Figure 1.A typical UMF RFID system. The passive RFID tag (Munteanu & Kakerow, 2014) comprises of a tiny chip attached to a printed antenna which receives the energy and back scatters to the reader antenna. RFID reader communicates a altered RF signal to the RFID tag consisting of an antenna and an integrated circuit chip. Reader antennas are strengthened by one (or) more reader who communicate the received tag data over Wi-Fi (or) Blue tooth to a server.

The reader antenna has the succeeding characteristics of compact, improvised directional gain, circular polarization, good impedance match, ease to integrate and low test. RFID antenna system use dipole antenna and loop antenna. The dipole antenna used to reception of electric fields. The loop antenna used to response of magnetic fields. Given that an inductive surface metallic plate near antenna could act as a reflector triggering the directivity to increase. The numbers of antenna types are required to a conductive ground plane to function appropriately. The enactment of the antenna can be enhanced by metallic surface. Since Metals are highly conductive. The incident wave in the metallic surface is almost totally reflected. Due to this, the radiation frequency can be transformed and the radiation pattern of antenna and the radiation efficiency to be decreased proposed, that the read range of numerous RF tags near a metal plate have been decreased and a water filled container along with deviations in the RF tag antenna input impedance near metal. Near field MF RFID smears the magnetic field effect to power tags. Far field UMF RFID antenna system smears the electric field effect to power tags. Low frequency and high