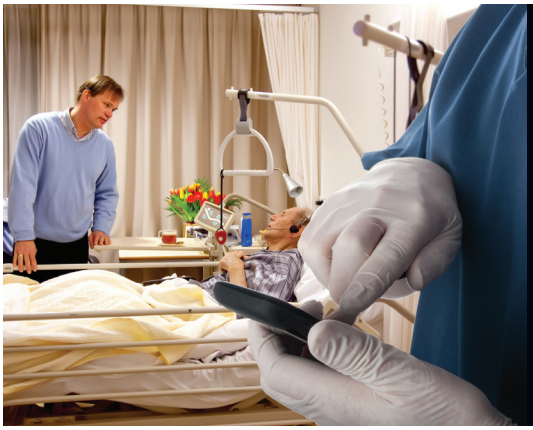


ANTENNA SOLUTIONS FOR HEALTHCARE

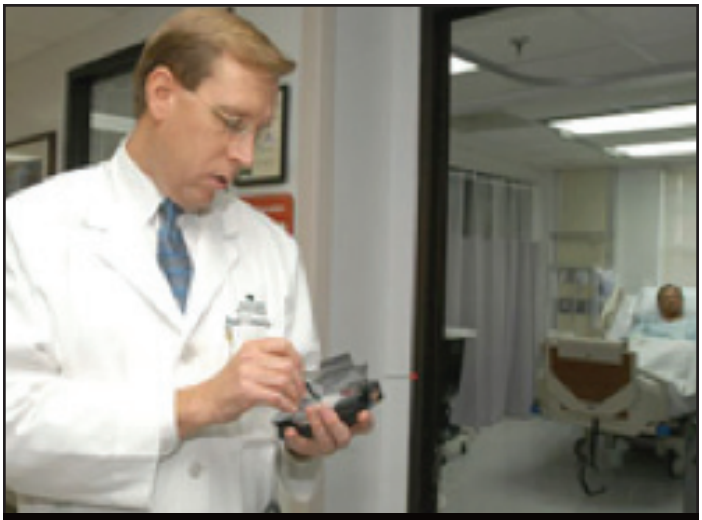
PCTEL™
simplifying wireless

Healthcare Antennas

The cost of healthcare represents one-sixth of the gross domestic product of the United States and it is projected to reach one-fifth by 2019.[1] In anticipation of this growth, the industry is under considerable governmental and consumer pressure to improve the quality and efficiency of healthcare services while keeping costs affordable to patients and caregivers.[2] Advances in information technology will play a crucial role in achieving this goal. Recent U.S. government regulations mandate the conversion of health records to electronic form (Electronic Health Records or EHR) by 2015. Over $36 billion of stimulus funds have been allocated through the American Recovery & Reinvestment Act of 2009 towards the creation of a nationwide network of electronic medical health records.[3]

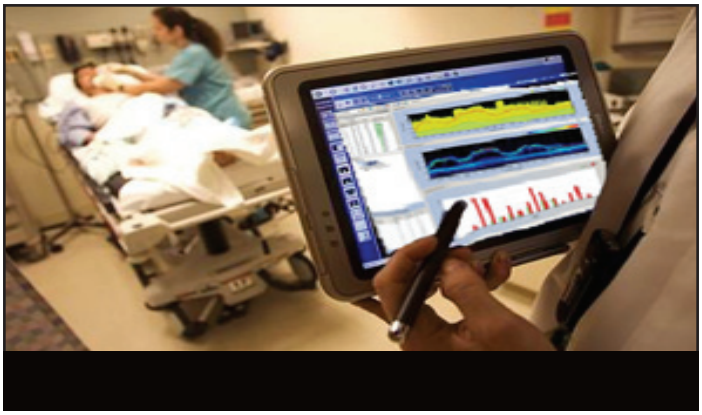
Wireless mobile healthcare networks, which are crucial for the transition to EHR, will help boost an already growing healthcare IT market. Healthcare facilities across North America forecast the implementation of wireless networks at an annual growth rate of 17 percent over the next few years. This growth has been fueled by the worldwide adoption of smartphone, wireless tablets, and wireless medical devices. It is estimated that more than one-third of 1.4 billion smartphone users worldwide will be using some type of mobile healthcare application by 2015. Nearly three-quarters of U.S. physicians will use smartphones to issue prescriptions, examine X-rays, monitor patients' vital signs and communicate with patients or nursing and administrative staff.[4]

The increased use of mobile healthcare applications and wireless devices for medical applications, including sensors and RF tags, has led to air wave congestion and increased RF interference caused by bandwidth limitations on many legacy networks. In addition, deficiencies in the architecture of wireless networks, or the quality of their components, have been the cause of coverage gaps, interference and poor data throughput. All of these problems can slow down or impair important data communications related to patient care. Poorly designed wireless LAN networks could also interfere with the operation of critical medical devices. With this in mind, the U.S. Food and Drug Administration issued a recommendation that all wireless networks and other devices that transmit medical data be regulated as medical devices.[5]



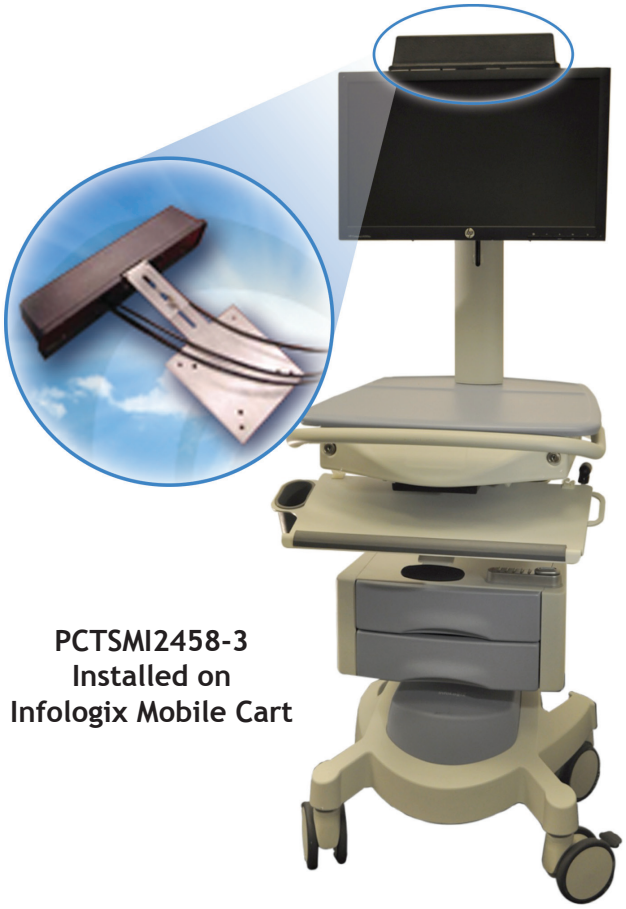
Immediate access to electronic records

Fortunately, interference between medical and wireless devices can be addressed through properly conducted wireless site surveys and competent wireless network architecture designs that include the correct antenna technology. Other criteria, such as the proximity, operating frequencies, and operating power levels of networking products like antennas, should be considered before deploying wireless equipment in medical environments. While interference could also be caused by medical devices that are not properly hardened from the



operating frequencies and power levels of the radio device, it is important for the wireless network designer to closely work with the engineering and technical staff of the facility to ensure all necessary information on existing medical devices is understood, and taken into account, prior to finalizing the architecture of a new network.[6]

Innovations such as mobile work stations, or "Care on Wheels" (COWs) have been shown to further increase efficiencies and streamline operations at hospitals. COWs are outfitted with a wireless computer that connects to the existing wireless infrastructure, allowing them to function as natural extensions to traditional nurse stations. The enhanced workflow that these devices provide has led to increased quality care and an improved nurse to patient experience, as nursing staff are now able to connect more effectively with real-time information at the point of care. Nurses also utilize these carts to bring medications and barcode scanning equipment to the bedside, documenting the transaction as it happens.



PCTSMI2458-3 Installed on Infologix Mobile Cart

The implication is that, provided a solid wireless network infrastructure is in place, the efficiency, accuracy and delivery of healthcare services can be enhanced. Medical workers that have quick access to critical patient data can provide real-time and potentially life-saving care during emergencies.

PCTEL has developed a selection of low-profile wireless antennas and enclosures designed to address the specific requirements of medical settings. Our medical cart mount MIMO antenna enhances mobile communications throughout the hospital as nursing staff moves between patients' rooms and the nurse's station. A Senior Wireless Engineer at a leading hospital system commented,

"The PCTSMI2458-3 antenna was exactly the solution we were looking for. In certain facilities, our legacy Wi-Fi network was never designed for some of today's necessary applications – like the COWs. Our facility needed to have a dual band MIMO antenna for our upgrade to 802.11n. The [old] antenna that was on the cart was located in the monitor arm, causing signal degradation when the cart was positioned in certain directions in relation to the access point. The placement location and

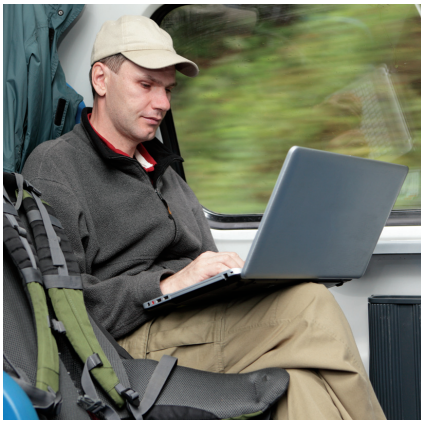
consistent signal characteristics of the new PCTEL antenna has resulted in RSSI gain of over 10 dB with the cart in certain positions, and has resulted in a much more consistent user experience, especially in key problem areas. [Before, the] The user impact due to application drops resulted in entire departments having to hardwire their workstations, at an additional cost of over $2000 per drop in in-patient locations. We have not had any carts [that have been retrofitted with the new antenna] have any residual coverage issues. It has been fully successful in every location."

"Our experience with PCTEL was excellent, from the first time we met with their Sales team, to the delivery of our custom product. Their depth of knowledge, attention to detail, and ability to consistently deliver to our specifications have made our project a big success."

PCTEL also offers above ceiling mount antennas and ceiling mount enclosures that provide optimized and secure, yet non-intrusive, support of wireless LAN networks in sensitive hospital areas, such as ORs and the ICU. For additional information, visit us at http://www.antenna.com.

Contact us for your Wireless Connectivity Requirements in Healthcare

PCTEL, Inc. is a customer-focused company dedicating its research and development to create high performance antenna products to meet market needs.



For more information on PCTEL's Comprehensive line of antenna solutions call 800-323-9122 or visit us at www.antenna.com. You can also write us at wireless.access@pctel.com

REFERENCES

1. Mearian, Lucas. "Healthcare will take up nearly 20% of the U.S. economy by 2019." Computerworld, June 8, 2011. http://www.computerworld.com/s/article/9217440/Healthcare_will_take_up_nearly_20_of_the_U.S._economy_by_2019

2. Mearian, Lucas. "FDA eyes regulation of wireless networks at clinics, hospitals." Computerworld, Jan. 10, 2011. http://www.computerworld.com/s/article/9203761/FDA_eyes_regulation_of_wireless_networks_at_clinics_hospitals

3. O'Harrow Jr., Robert. "The Machinery Behind Health-Care Reform." The Washington Post, May 16, 2009. http://www.washingtonpost.com/wp-dyn/content/article/2009/05/15/AR2009051503667.html

4. Mearian, Lucas. "Healthcare IT spending to hit $40B this year." Computerworld, May 26, 2011. http://www.computerworld.com/s/article/9217065/Healthcare_IT_spending_to_hit_40B_this_year

5. "Radio-Frequency Wireless Technology in Medical Devices." U.S. Food and Drug Administration, U.S. Department of Health and Human Services, January 2, 2007.

6. "Wireless LAN Equipment in Medical Settings: Addressing Radio Interference Concerns." **Cisco Systems, Inc., 12/02.**