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Mobile Telemedicine with WIMAX: The secure method to the future of medicine

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ABSTRACT

Through the usage of telecommunications era to deliver wi-fi care and share medical expertise over a distance, telemedicine pursuits at imparting professional-based medical care to any vicinity and at any time fitness care is wanted. Even as the number one telemedicine eservices were furnished, telemedicine packages have been carried out over wired communications generation which include plain antique cellular telephone community (POTN) and integrated services virtual community (ISDN).Cutting-edge trends in telemedicine because of wireless advances are promoting wireless telemedicine, additionally called m-health wireless or cellular wireless.

Keywords:telemedicine services, medical care, plain antique cellular telephone community, integrated services virtual community

I.INTRODUCTION

Many patients with diseases difficult to diagnose and treat come to hospitals for medical help, and the cost of traveling and accommodation is high for them, especially for those from the poor or remote border areas. As networks become more advanced and increase in speed, various energetic activities have begun to emerge. New networks will cause a major revolution in society, and one area, which is expected to be an effective application of new networks, is telemedicine. In general, Telemedicine can be defined as the delivery of health care and sharing of medical knowledge over a distance using telecommunication means. Telemedicine provides medical information exchange at a distance, to support medical procedure, with the ultimate goal for improving community health care. In these experiments, integrated functions such as the transmission of medical images, collaboration and video conferencing, and provided superb human interfaces for telemedicine. As high-speed broadband networks spread, telemedicine support functions and areas where telemedicine services are available will increase. In the medical field, the emergence of a new format for medicine is expected, to include an equalization of opportunities to receive advanced medical treatment, and providing exacting medical care by linking hospitals and clinics.

Usually, wi-fi telemedicine structures consist of wearable scientific gadgets and wirelesscommunications networks. Wireless communications overcomes most geographical, temporal,and organizational limitations to the transfer of medical statistics and data. So as to offer ubiquitous availabilityof multimedia offerings and programs, wireless and cellular technology are evolvingtowards integration of heterogeneous get admission tonetworks collectively with wi-fiareanetworks (WPANs),a nearby area networks (WLANs), wirelessmetropolitan areanetworks (WMANs) further to third-era (3G) and beyond 3G cellular networks.A hybrid networkbased totally on IEEE 802.11/WLANs and IEEE 802.16/WiMAX is astrong contender thinking about the truth that each technology is designed to provide ubiquitous low cost, excessive-tempo statistics charges, remarkable of provider (QoS) provisioning, and broadband wireless Internetaccess.IEEE 802.eleven/WLAN is the equal antique to offer mild- to high-velocitydatacommunications in a brief range normally interior a constructing. The IEEE 802.16/WiMAX isthe stylish to offer broadband wireless services requiring immoderate-price transmission andstrict QoS requirements in both indoor and outside environments. Numerous superior medicalapplications inclusive of some distance off have a look at-up, a ways off prognosis, intervention on non-portable sufferers, remote monitoring, remote assistance, and scientific e-learning are anticipated to beimproved by means of the use of WiMAX.

Mobile telemedicine systems can be deployed for emergency telemedicine services, cell affected individual monitoring, and cellular wireless provider agency. Safety is a significant requirement for any conversation surroundings; a mobilehealthcare device with affected person tracking isn't always any exception .Despite the fact that actual-time monitoring and factstransmission offers vital statistics short; it can also divulge a patient's scientific statistics tomalicious intruders or eavesdroppers.If an m healthcare system lacks the important protectionwhen speaking records, unauthorized events or folks can without wireless get right of entry to the personal dataof a patient, scientific statistics may be modify freely throughmalicious attackers, and falseinformation can be injected into the facts flow through a prohibited node.

As a cease end result, while making plans cellular wireless-care systems, protection isindispensable because of the shared nature of gadgets, the mobility of the sufferers,and the susceptibility of dynamic and pervasive environments. Because of the essential functionof m-healthcare, affected person monitoring may be a inclined factor by which an attacker might also threaten the completefunctioning of the machine, or even mislead scientific specialists tomake wrong selections.On this we look at the troublesof affected man or woman monitoring from the perspective of cell healthcare, and display how modern day relaxed strategies are completed to reap the securityand privacy requirements.In next we in brief describe the reliability, performance and securityissues of m-healthcare and BSNs. Ultimately; Papers attention is at the techniques of patientmonitoring and comfortablehealthcare mechanisms.

II.LITERATURE SURVEY

Wireless telemedicine services over integrated IEEE 802.11/WLAN and IEEE 802.16/WiMAX networks

This [2] paper focuses on the software of integrated IEEE 802.sixteen/WiMAX and IEEE 802.11/WLAN broadband wireless get entry to technologies in conjunction with the related protocol issues for telemedicine

services. It gives overview of IEEE 802.11/WLAN and IEEE 802.sixteen/WiMAX technology, and makes a comparison between IEEE 802.eleven/WLAN and IEEE 802.16/WiMAX.

Monitoring patients via a secure and mobile healthcare system

This paper [4] gives numerous techniques that can be used to monitor sufferers successfully and beautify the capability of telemedicine structures, and speak how cutting-edge comfy strategies can obstruct the attacks confronted with the aid of wireless communications in healthcare structures and enhance the security of cell healthcare.

III.WLAN And WIMAX Overview

3.1WLAN evaluation

WLANs are generally used of their 802.11a, 802.11b, and 802.11g variations to provide connectivity in domestic, wireless, and some industrial establishments; they arealso substantially deployed in telemedicine systems. because the early 1990s,the commercial, clinical,and medical bands,2.4GHz and wi-fi GHz, had been made to be had for WLAN, amongst whichthe 802.11b and 802.11g protocols are the maximum famous.IEEE 802.11 WLANs are mostsuitable for community telemedicine services. IEEE 802.11e can be used for transmitting sensitivemedical records with QoS help, and IEEE 802.11i offersprotection aid as an amendment to the authentic IEEE 802.11 modern through specifying securitymechanisms for WLANs. However, WLANs have barriers in phrases of mobility and insurance place.

3.2WIMAX review

IEEE 802.16/WiMAX is a ultimate get of access to answer that gives baseline talents for flexibility in spectrum to be used everywhere within the global. Wireless of usingWiMAX fora telemedicine packages over WLAN-based totally wi-fi structures can besummarized as follows:

- Broadband wireless access in both wi-fixed and cellularenvironments
- Excessive bandwidth to reduce transmission do away with snapshots appreciably
- blanketed offeringssupplied by way of the network potential of WiMAX enabling fullyfunctional telemedicine services together with varioussorts of diagnostics, physical monitoring pharmaceutical and drug dosage management offerings, accurate exceptionalconversationalcommunications between a medical doctor and a affected person,and session amongst medicalspecialists
- Medium Access Control (MAC) layer safety capabilities of WiMAX providing get admission to controland encryption capabilities for wireless telemedicine offerings
- QoS framework describedwireless in 802.16e allowing inexperienced and reliabletransmission of medicaldata

3.3Comparision amongst WLAN and WIMAX

- The maximum critical difference among WLAN and WiMAX is that they're designed for virtually special applications.
- WLAN is the standard to provide slight- to excessive-speed facts communicationswithin a quick variety, normally insidea building.
- WiMAX is the same old to offer internet get right of entry to over an prolonged variety outside environment.
- All WLAN implementations use unlicensed frequency bands, but WiMAX canoperate in both certified and unlicensed spectrum.

IV.SYSTEM ARCHITECTURE

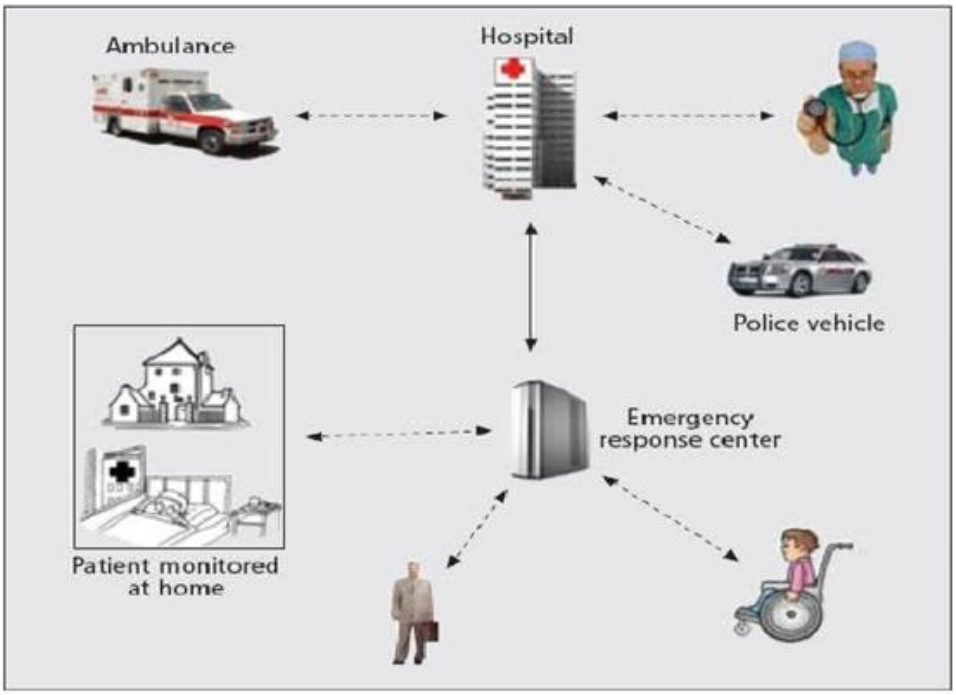

Fig 1. System architecture of mobile Telemedicine

Cellular telemedicine systems may be deployed for emergency telemedicineservices, mobile affected person monitoring, and mobile fitness carrier issuer.

4.1Emergency telemedicine:

A cellular telemedicine system has the potential to reducemedical headaches of sufferers in need of emergency care which include in a catastrophe and rescueoperation. It could enhance emergency care survivals substantially. The cellular telemedicinesystem will transmit important bio-alerts (e.g., heart price and blood

stress) and other statistics (e.g. images of injuries due to accidents) from an emergency website to the health facility, and medicalexperts can provide pointers and commands appropriately in a timely way.

4.2Mobile affected person tracking and healthcare company:

Patientmonitoring enables real-time patient tracking which can use clever sensors to acquire patientsimportant signs so that medical specialists can perform diagnoses anywhere and at any time.

4.3Mobile scientific statistics:

Whole affected person histories are reachable wirelessly. Clinical datacan be searched from other sufferers with comparable symptoms in order to study from other preceding reports. Taking privacy into attention, only clinical records isavailable, without disclosing the identity of the specific patient. Bothpatients and medicalstaff can wirelessly get entry to patients' scientific information.

4.4Mobile robot structures:

Cell robot systems enable medical examiners to controlmedical devices which include ultrasonic gadgets at the patient facet in remote regions. given that medicalexperts can manipulate gadgets through networks, they can efficaciously measure precise medicalinformation, and sufferers do not need to perform clinical gadgets. Cellular Tele-EchographyUsing an ultra-LightRobot (OTERO is a superb example of thistype of service.) In order torealize cellular robot systems, actual-time communications and massive sufficient bandwidth for transmitting excessive-resolution virtual films and pictures need to be provided, and WiMAXtechnology fulfills those necessities.

4.5Pre-health facility care:

WiMAX era can also enhance pre-health facility care in anambulance.Ambulance crews can get admission to the medical statistics database in a clinic andretrieve the desired clinical information of sufferers throughWiMAX networks. Combinationof video streaming and robotics systems will permit a medical doctor in a health center to perform therequired inspection and prognosis until the ambulance arrives on the health facility.Figure 2 suggests an excessive-degree system version based totally on the covered WiMAX andWLAN wireless network for a telemedicine network connecting hospitals, clinics, drugstores,cellular ambulances, a affected person information manage database, cellular experts, and patients at home in addition to mobile patients.The hybrid system can be divided into fivesubnetworks: body region networks (BANs), home care community/telehomecare, intranet of ahealthcare provider, along with a clinic, a clinic, and a drug preserve, a network a few of the patient home and the healthcare corporation, and a cell telemedicine network for cell patients and fitness company carriers.A wi-fi heterogeneous network of WLAN, WiMAX,and 3G cellular networks (dashed traces) is also established.

The included WiMAX and WLAN wi-fi telemedicine networks may be deployed in thefollowing situations.

5.1 BANs:

The BAN is a mainly appealing method to provide statistics about thehealth repute of a affected person in medical environments together with hospitals or clinical facilities. Theintegrated 802.sixteen/802.eleven wi-fi-community-based telemedicine gadget can also providemedical services mobile customers.IEEE 802.15.4/Zigbee era is used by a BAN to detect and is expecting the human physiological states of wakefulness, fatigue, and pressure. One-of-a-kind tracking sensors areintegrated to connect to a patient's frame, aiming to acquire indicators approximately EEG, ECG, EOG, andEMG. The proposed BAN is a regular wireless sensor community and contains modules: a private statistics processing unit (PDPU), which controls all sensors and is connected to externalnetworks, and a sensor communication module (SCM) which uses wi-fi links, includingIEEE 802.15.4 and Zigbee, to speak with a PDPU.

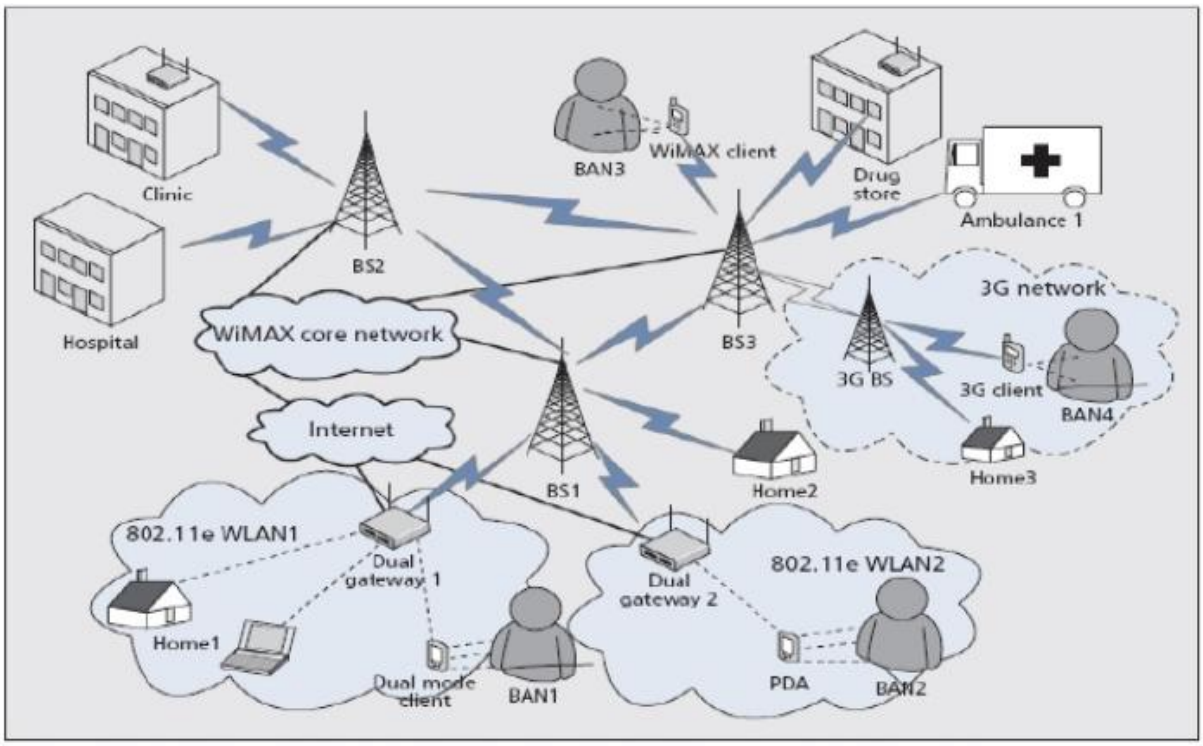

Fig 2.WiMAX and WLAN wireless network for a telemedicine network

5.2Home care network/TeleHomeCare:

Domestic care is a growing area in fitness careand is a promising method to the medical troubles of modern society. The population census suggests an growing trend of the senior populace. Furthermore, modern lifestyles are turning into greater disturbing than ever; consequently, prolonged treatment is becoming more important. Domestic care finished remedies in the affected person's house with the assistance of the familyreduces the want to move sufferers between homes and hospitals.in the integrated WiMAXand WLANnetworks, patients may also are living at home for far off patient tracking throughеither connecting directly to a WiMAX BS ready with a WiMAX customer like Home2, or connecting to WLAN dual-mode APs like home 1.

5.3Intranet of a healthcare issuer/intra-hospital services:

WiMAX is a more sensible and price-effective answer for clinic intranet deployment due to the relativelylarger insurance vicinity of WiMAX networks than that of WLAN APs. The deployment of aWiMAX community in a medical institution will reduce operation and protection fees, at the same time as offeringfull mobility guide for patients and scientific team of workers.

5.4Clinics and drugstores:

In assessment to a clinic, WLAN APs can possibly provideenough coverage for clinics and drugstores. Consequently, dual mode WLAN APs can bedeployed at clinics and drugstores to communicate with healthcare centers through WiMAXinterfaces and to provide neighborhood wi-fi insurance thru WLAN interfaces.

5.5Wireless video telephony:

A number of telemedicine packages are based totally on thetransmission of clinical video, such as far off clinical action structures, patient far flung tele-monitoring facilities, and transmission of clinical movies for instructional purpose. Videos/photographs are required to make sure right prognosis and/or assessment. Videotransmissions over a WiMAX network have proved to be an effective and green platformin imparting right video content delivery.

V.CONCLUSION

Modern wireless telecommunication technologies like WiMAX enable the provisionof telemedicine services to locations previously unreachable via landlines.The mobility and short deployment supplied by means of wireless communications will helpchange our former perspectives of the clinical treatment in preferred, enabling excessive qualityhealth provider remotely and inexpensively.

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