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5G-Enabled Medical Data Transmission in Modern Mobile Hospital Systems Using IOT

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ABSTRACT: As one of the healthcare development trends, nowadays mobile hospital system needs more advanced treatment and diagnosis and it require high data transmission speed.5G can serve an effective transmission to meet the modern mobile hospital systems requirements.5G is expected to offer significant communication performance, including higher transmission reliability, higher connection density with lower density when compared to fourth generation. Hence, It defines a 5G network slicing – based techniques & is used for transferring the data to the hospitals. There are two types of slicing techniques is used for data transmission through 5G network, namely enhanced mobile broadband (eMBB) and ultrareliable and low-latency communications(uRLLC) slice. We proposesattribute-based access control and a new privacy-preserving scalar product computation (PPSPC) techniques is used to transmit the data from ambulance to hospital center with more privacy.

KEYWORDS: reliability, lower density, network slicing, privacy, transmission.

I. INTRODUCTION

5G enable a new kind of network that is designed to connect network virtually to everyone &everywhere. The emerging fifth generation communication system(5G) more reliable and higher throughput, massive network capacity, increase availability and ultralow latency. By the way, 5G is most importantly used in hospitality industry. It is more secure when compared to older wireless communications with advanced encryption protocol, better privacy protections. 5G is more helpful for transfer the data including high data transmission speed, capacity with lower latency. 5G network is more reliable & transfer data needed for hospitals to make quick, remote healthcare decisions for patients. m-Health is used for the practice of medicine and public health supported by mobile devices. Patients in critical condition need physician supervision while they are transmit to the hospital. If the ambulance is linked to the emergency room, then the doctors in the hospital views the patient report and give the instructions to the staff who is present inside the ambulance. The mobile health (m-health) is currently bring together major academic research and industry disciplines to achieve innovative solutions to worldwide in the area of healthcare delivery and technology sector. Knowledge of these requirements is important to developers “who develops without an error and so on”, network providers and regulatory authorities in the healthcare sector to facilitate safe and effective caring a patients.

II. LITERATURE REVIEW

1.Performance analysis of medical video streaming over 4G and beyond small cells for indoor and moving vehicle (ambulance) scenarios

Mobile healthcare (m-health) is an evolving paradigm that brings together the evolution of emerging wireless communications and network technologies with the concept of “connected healthcare”[10].The current 4G communication system lacks the required capability to support such advanced medical methods and then restricts mobile hospitals’ development [10].Moreover, mobile hospital systems nowadays require a larger capacity connection, higher data transmission speed, reliability, and lower delay, which cannot be supported by 4G.



2. Enable advanced QoS-aware network slicing in 5G networks for slice based media use cases

Healthcare in remote underprivileged rural areas is generally not of high quality [15]. The limited primary health care centers dedicated to large geographical areas usually suffer from a high rate of daily visits. Furthermore, most of the time, they do not have sufficient technological resources to transfer accurately the patient information to secondary and tertiary healthcare centers [15]. In these areas, the lack of medical personnel can be partially compensated by resorting to social workers who help the patients to contact the physicians remotely using wireless connectivity.

3. Dynamic resource allocation with RAN slicing and scheduling for uRLLC and eMBB hybrid services

A dynamic optimization model considering power consumption and service quality is used to construct the cost function in both time domain and frequency bandwidth for heterogeneous services, subject to the latency constraint [6]. A novel two-timescale algorithm with employing Lyapunov optimization is designed, including two sub-algorithms: long-timescale bandwidth allocation and short-timescale service control. In further, the theoretical optimality is analyzed according to the relationships between control parameters and service performances [6]. The utility of our approach and its hard latency guarantee are also illustrated through simulation results under tolerable power consumption.

4. 5G enabled mobile healthcare for ambulances

It presents a complete framework for a 5G enabled connected ambulance that focuses on two-way data communication including audio-visual multimedia flow between ambulances and hospitals. The model includes wireless transmission, based on a 5G network, of three types of data i.e. ultrasound videos, in-ambulance video streaming and vital signs measurements of patients [14]. This will enable the doctors to remotely assist and guide the ambulance crew to provide initial medical care to in-ambulance patients [14]. A discussion based on the network requirements of mobile healthcare is also provided.

5. Joint Transmission in Cellular Networks with CoMP - Stability and Scheduling Algorithms

To develop optimal and approximation algorithms for specific and general topologies, respectively. We consider a time dimension and study a queueing model with packet arrivals in which the service rates for each subframe are obtained by solving the OJS problem [2]. To prove that when the problem is formulated with a specific utility function and solved optimally in each subframe, the resulting scheduling policy is throughput-optimal. Via extensive simulations we show that the bulk of the gains from CoMP with JT can be achieved with low capacity backhaul.

[2] Moreover, our algorithms distribute the network resources evenly, increasing the inter-cell users' throughput at only a slight cost to the intra-cell users.

6. Channel coding scheme for 5G mobile communication system for short length message transmission

This paper evaluates different channel coding schemes (LDPC, turbo, polar, systematic convolutional, and non-systematic convolutional codes) on an AWGN channel with BPSK modulation of code rate 1/2, in order to suggest the optimum channel coding scheme for the 5G mobile communication system for short length message transmission in machine-type communication [3]. The main user requirements of machine-type communication for 5G channel coding scheme are better flexibility, low complexity, low latency, and high reliability in communication [3]. Hence, the evaluation of different channel coding schemes is mainly based on satisfying user requirements in machine-type communication.

III. SYSTEM STUDY

EXISTING SYSTEMS

In fifth generation (5G) mobile communications technologies into digital healthcare technologies can expand the communication capabilities given that 5G high data speed, ultralow latency & massive connectivity throughout the network, increased network capacity and increase availability. 5G can serve effective transmission to meet the modern mobile hospital systems. 5G enabled healthcare applications is most efficient to diverse the communications between



the ambulance and the reporting authority in the hospital side. It is more reliable to transmit the data through network to get a suggestion and instructing the staffs inside the ambulance from the doctors in the hospital is most important. This system applied the slicing techniques to C-RANs of heterogeneous to 5G cellular network to exchange medical data between ambulance & hospital center. The Optimal Resource Allocation algorithm is used for high transmission reliability with very low latency.

DISADVANTAGES

- ✓ Many of the old devices would not be fixed to 5G.
- ✓ Lower connectivity speed.
- ✓ Developing infrastructure needs high cost.
- ✓ Security and privacy issues yet to be solved.

PROPOSED SYSTEM

Smart healthcare is undergoing rapidly transform from specialist doctors and hospital-focused style to the patient focused manner. Several technologies has encouraged to develops the rapid revolution of healthcare but it is difficult for current communication technologies to fulfil the requirements and time-sensitive healthcare applications in future. Therefore, the 5G networks are being designed and developed to tackle all the problems has occurred before. In this system, to implement the system implementation for emulations and experiments. Current connectivity solution for IOT face challenges such as, It support for a massive number of devices, energy efficiency, device density and security. It presents a structure for healthcare in 5G by categorize and classify existing work. First, propose 5G network, a secure and privacy preserving opportunistic computing framework for m-healthcare emergency. When the patient is in the emergency situation, the user gathers personal information from patient and send it to the center storage and the doctors who currently stayed in the hospital will send the request to the ambulance medical user. After the request arrive, the sensor machine above the patients gather all the medical reports such as blood count, blood pressure, blood sugar.

IV. METHODOLOGY

PERVASIVE HEALTH MONITORING IN M-HEALTHCARE

This module can collect each mobile medical user's Personal Health Information (PHI) such as heart rate, blood sugar level, blood pressure, temperature, etc. first by BSN and then aggregate to smartphone via Bluetooth. Finally, they are further transmitted to the remote healthcare center via 3G networks. Based on this collected PHI data, health center medical professionals can continuously monitor the health status of medical users. It can also save users' lives by responding quickly to life-threatening situations and dispatching ambulances and medical personnel to emergency locations on time.

BODY SENSOR NETWORK

This module explores applications for portable computing devices using Body Area Networks (BAN), Wireless Body Area Networks (WBAN), or Body Sensor Networks (BSN). It enables wireless communication between multiple miniaturized body sensor units (BSU) and a body central unit (BCU) worn on the human body.

– Deploy wearable sensors on the bodies of patients in a residential setting.

– Continuously monitor physiological signals (such as ECG, blood oxygen Levels) and other health related information (such as physical activity).

SECURITY ANALYSIS

This module will develop a secure and privacy-preserving opportunistic computing framework to ensure high reliability of PHI processing and transmission while minimizing PHI privacy exposure in M Healthcare emergencies. Specifically, we

i) Apply opportunistic computing in m-Healthcare emergency to achieve high-reliability of PHI process and transmission; and



ii) Develop user-centric privacy access control to minimize the PHI privacy disclosure.

PERFORMANCE EVOLUTION

This module, the performance metrics used in the evaluation are

- 1) The average number of qualified helpers (NQH), which indicates how many qualified helpers can participate in the opportunistic computing within a given period of time, and
- 2) Average resource consumption is Ratio (RCR) is defined as the ratio of resources consumed by medical users in an emergency to the total resources consumed in opportunistic data processing for PHI processes within a specified time period.

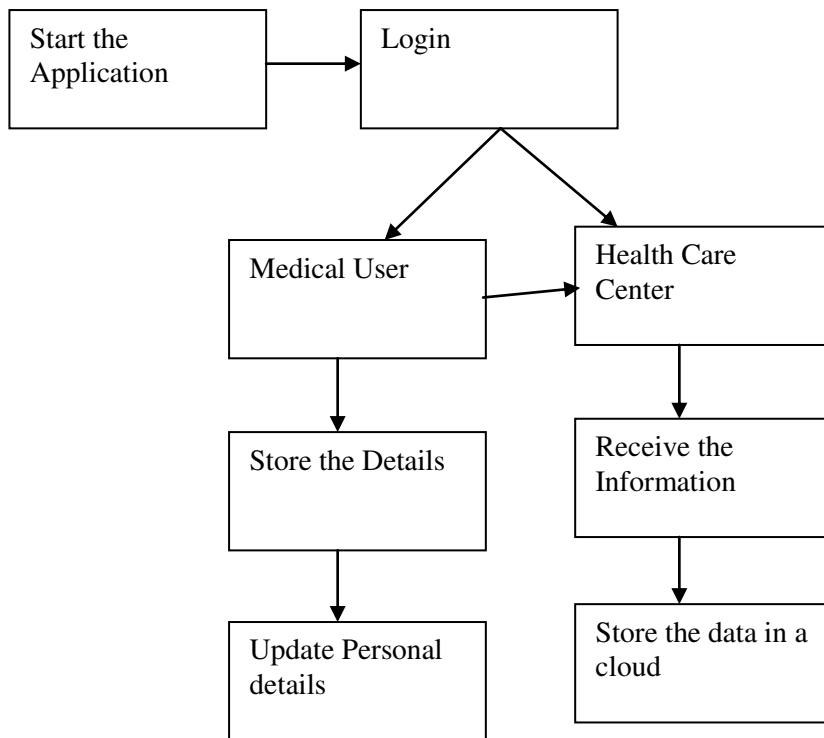
SIMULATION SETUP

This module, the simulator implements the application layer under the assumption that communication between smartphones and between BSN and smartphones works whenever they are within transmission range of each other.

REPORT GENERATION

This module, Health care center generate crystal report from the database collection for future references.

ARCHITECTURE DIAGRAM



V. CONCLUSION

This paper proposed, how the data can be transmitted between the ambulance and the hospital center. Picture type changes are possible that is, .jpg picture file is changes to .bmp types. To provides better security for secret messages.



The information of the patients conditions will be send privately to hospital centre's by hiding a message. Message hiding file can be depend upon type of picture file such as .bmp occupies large number of messages. It won't change the quality of images such as blur, contrasting, zoom-in & zoom-out. To find delimiter for each type of picture; according that to hide the text with in an image so picture quality cannot be affected.

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