Intelligent Health Prediction in Cloud Environments with Integrated Fault Tolerance and Clustering

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Abstract

The importance of health monitoring as an enabling technology for the future development of sensors has been widely accepted. A lot of literature in the recent past has optimized the performance of Health Monitoring in terms of energy conservation, energy harvesting, path and latency optimization. The major work in the Health Monitoring related to MAC and network layer issues. In order to take the advantage of Health Monitoring, to create a robust Cloud infrastructure routing protocols in the wsn need to be revisited. So in this Report, the cluster-based routing protocols that appear to be applicable for the Cloud infrastructure have been identified. In doing so, the performance of Ehealth monitoring with fault tolerance in cloud was found to be better. Restricted energy is of prime worry for the Health Monitoring, as well spring of energy is limited. Sensor Nodes are utilized to intermittently detect nature, do constrained preparing before transmitting the detected information to their cluster heads (CH) and occasionally take an interest in the cluster head determination handle. In this manner transmitting Nodes limit energy wastage in transmission past the area of intrigue and abstain from catching by the vast majority of the nodes. Using priority queue reduces the packet drop ratio. Hence more packets are transferred from nodes to CH and from CH to BS. Rather dense network is considered in which Intra-cluster correspondences are performed at lower power level and just those cluster heads are permitted to seek cluster head determination, which have remaining energy over an edge level. The performance of Ehealth monitoring with fault tolerance in cloud, SEP, Health Monitoring with low energy aggregation protocols has been evaluated in terms of important performance metrics like throughput, dead nodes, energy consumption and packet transmitted to base station.

CHAPTER 1
INTRODUCTION

1.1 MOTIVATION

The wireless sensor network is a system which is widely used to move the data from source towards destination. Problem stars to arrive as sensor has limited power and energy and large amount of data is to be transferred which leads to high degree consumption. Energy preservation protocol is created to conserved energy. For this purposes health monitoring with fault tolerance in cloud with grid problem which is optimizes version of leech is created. But considerably high amount of energy is consumed while data is moved from one cluster head to another. Since large network is considered. The primary objective of this research is to minimized energy consumption by considering a dense network.

1.2 BACKGROUND ANALYSIS

(Zhou, Yao, Xing, Shu, & Bu, 2016) [1] Machine-to-Machine (M2M) correspondence alludes to advancements that empower both remote as well as wired frameworks to speak with different gadgets in homogeneous or potentially heterogeneous system without human intercession. Machine gadgets are equipped for handling the occasions caught by sensors and sending them through M2M passage. Presently, remote sensors are the principle building pieces of M2M correspondence and being sent in different frameworks, including Surveillance Systems, Smart Grid, and Healthcare Monitoring Systems. M2M sensor systems don't have fixed framework; as needs be, the topology of the M2M sensor systems shift from star to multi-jump work arrange. (Yao, Zhou, Shu, & Xing, 2015)[2]These systems may have distinctive hub qualities contrasted with different systems in the parts of hub little size, ease hub, visit hub disappointment because of constrained vitality assets; irregular organization and bi-directional correspondence capacities to control the remote hub exercises relying upon the application needs. Because of various sensor capacities in heterogeneous M2M systems, rehashed and unforeseen topology changes are normal issue.(Yan, Zhou, & Ding, 2016)[3] Thusly, M2M conventions and calculations should be vital efficient and self sorted out. Machine gadgets must efficiently utilize their vitality stockpiling since a few gadgets are battery fuelled and need to keep running for quite a while without charging the batteries, this can be accomplished by putting their correspondence radio wire when it is a bit much in rest mode. The

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need to keep running for quite a while without charging or changing the batteries, this can be accomplished by putting their correspondence radio wire when it is a bit much in rest mode. The vitality devoured by the sensor hubs comprises of correspondence and calculation energies. The principle wellspring of vitality utilization in the sensor hub is the vitality devoured by interchanges. (Conference & Techniques, 2016)[4] In this manner one of the techniques used to diminish vitality utilization and stretch out system lifetime is to choose suitable topology for M2M sensor arrange and performs rest component in various leveled structure.
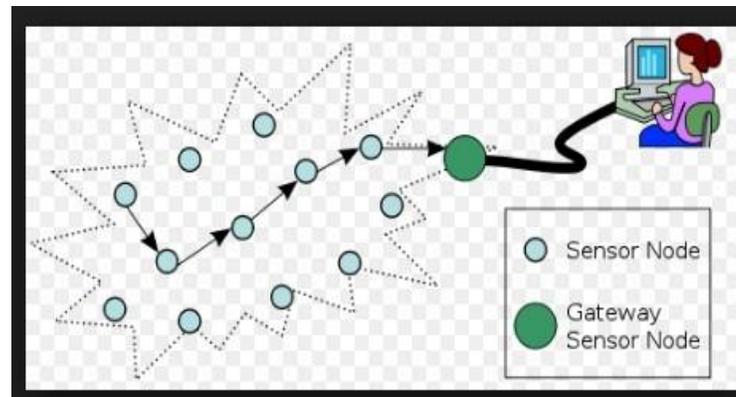
■ **Figure 1.1: Structure of Health Monitoring**

- As per Mobile Ad hoc Network (Health Monitoring) is depicted by flexible hosts, dynamic topology, multi-hop remote accessibility and system less uniquely designated condition. (Pal, Mittal, Pandey, & Saraswat, 2016)[5] A Health Monitoring contains flexible centre points, a switch with various hosts and remote particular contraptions.

- The principal characteristics of such frameworks are dynamic topologies, obliged achievable exchange speed, heterogeneous correspondence associations, and limited battery control. Here the hubs are normally powerful which can be available at wherever with a remote connection by an omni directional receiving wire. (Wang, Cho,Tsai, & Jan, 2017)[39]Hubs while conveying can have self-assertive topologies.

- As the hubs are self arranged and dynamic so Health Monitoring has extremely immense application region beginning from individual necessity, catastrophe hit territories to safeguard. While doing any information exchanges the care must be taken that the information achieves the goal inside a restricted time with minimum vitality devoured by the hubs. (Rao, n.d.)[7]For this Clustered Bee Ad

- As time advances and innovation propels there is an expanding development of remote interchanges and furthermore of information rates, and with the ceaselessly expanding base of clients of versatile remote

correspondences, appeal for broadband has risen and the new utilizations of remote sight and sound are framed the principle motivation to the improvement of the LTE propelled systems. Customary remote frameworks will neglect to take care of the interminably developing demand for range and accessibility. The advancement of D2D innovation is accordingly raised to empower productive and stable correspondence between gadgets through direct movement trade. Coordinate connections between gadgets has many favorable circumstances underneath are a few:

- •Data rates: paying little respect to the separation between the gadgets and the cell framework foundation, which can't bolster trading high information rates over long separations, in D2D specialized gadgets can trade high information movement.

  - Reliability: D2D correspondence can be utilized to convey straightforwardly regardless of the possibility that the LTE framework falls flat for any reason. •Instant correspondence: in a D2D correspondence a set number of gadgets can be utilized for moment interchanges similarly walkie-talkies are utilized. •Less power utilization: utilizing D2D correspondences can diminish the power utilization in light of the fact that if the gadgets are near each other then less power transmission is required. While D2D interchanges has many points of interest, the expansive utilization of D2D correspondences can create undesirable impedance to the clients while using similar assets. The utilization of LTE D2D correspondences influences the whole system, cases, for example, approval and confirmation are prepared by the system so the LTE framework must be extended to handle D2D interchanges without the essential nearness of the system. Figure 1 demonstrates a general D2D in LTE-propelled arrange.

CHAPTER 2

LITERATURE SURVEY

The major contribution available in the open literature related to clustering protocols has been enumerated below.

(Wang et al.)[27] Proposed a health monitoring with low energy aggregation and SEP steering conventions focused on remote sensor systems are highlighted in this paper. The quantity of sensor hubs in Health Monitoring is adequate and a solitary hub is incredibly constrained in asset. The chief goal of the steering convention configuration is to propel the vitality proficiency and delay the system lifetime. This paper has chosen the Health Monitoring with low energy aggregation steering convention as our exploration centre to break down the particular execution of the directing calculation, vitality of sensor hubs and system lifetime. MATLAB organize re-enactment device is utilized to reproduce the steering convention and information investigation.

(Alnawafa)[3] Implemented a technique to utilize connections to upgrade arrange operations as far as vitality efficiency and information quality for information accumulation applications. We introduce a novel approach that utilizations spatial relationships between geographic neighboring hubs to shape maximal inner circles. At that point, we apply it to convention Health Monitoring with low energy aggregation by adding a pre-determination stage to choose delegate hubs in every club to be initiated for Health Monitoring with low energy aggregation operations. Matlab TM simulations demonstrate significant change of vitality efficiency of our proposed convention Health Monitoring with low energy aggregation-SC, while it jellies information quality spoken to by the quantity of information bundles conveyed to the base station and the bunch heads, and the system scope proportion in examination with convention Health Monitoring with low energy aggregation.

(Midasala)[13] discussed a Low Energy Adaptive Clustering Hierarchy (Health Monitoring with low energy aggregation) convention is considered as a standout amongst the most essential conventions that are every now and again utilized as a part of the Wireless Sensor Network (Health Monitoring). Numerous conventions were created to alter and enhance the Health Monitoring with low energy aggregation convention. The multi-bounce strategy (MHT Health Monitoring with low energy aggregation) is one of these conventions, which seemed to enhance the execution of the Health Monitoring with low energy aggregation convention. In this paper, an enhanced multi-trust strategy (IMHT-Health Monitoring with low energy aggregation) is proposed. Rather than appropriating all the Cluster Heads (CHs) into two levels as in the MHT-Health Monitoring with low energy aggregation,

the IMHT-Health Monitoring with low energy aggregation disperses all the CHs into various levels. It recommends another system to course the information to the Base Station (BS) through the levels. Recreation comes about show that the IMHT-Health Monitoring with low energy aggregation enhances the lifetime, solidness and throughput of the Health Monitoring contrasting and the customary Health Monitoring with low energy aggregation and the MHT-Health Monitoring with low energy aggregation conventions

(Pal et al.)[15] Suggested a Wireless Sensor Network Consists of substantial number of sensor hubs, which are associated through remote medium has developed as a historic innovation, which offers the capacity to gauge the physical world parameters precisely. Right now there are some unique kind of directingconventions are intended for sensor systems. All of these directing conventions have considered thevitality effectiveness as the goal keeping in mind the end goal to augment the life time of the entire sensor arrange. So far the current directing conventions accessible in Cloud (Health Monitoring) are information driven, progressive, and area construct and with respect to request steering conventions. As Health Monitoring comprises of a gathering of utilization particular sensors, the viable utilization of vitality requires effective steering conventions. The group based convention are Deterministic vitality effective bunching (DEC), SEP-E are most appropriate as far as vitality productivity.

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Chapter 3

PROBLEM FORMULATION

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3.1 GAPS IN LITERATURE

Health monitoring with fault tolerance in cloud is the protocol which is considered for evaluation in the proposed literature. Health monitoring with fault tolerance in cloud does not require any global knowledge of energy at every election round. Health monitoring with fault tolerance in cloud can perform well in multi- level Heterogeneous wireless network. Energy consumed decreases subsequently in case of health monitoring with fault tolerance in cloud. Energy consumption along with packet drop ration can be further reduced. Advanced nodes always penalize in the health monitoring with fault tolerance in cloud, particularly when their residual energy reduced and become in the range of the normal nodes. In this position, the advanced nodes die rapidly than the others. The limitations are elaborated as under

* Advanced nodes energy always dissipated quickly as compared to other nodes.
* Packet drop ratio is high.
* Residual energy dissipated quickly.
* Packet to Base station is limited.

3.2 PROBLEM FORMULATION

The importance of Health Monitoring as an enabling technology for the future development of Cloud has been widely accepted. Cloud is a culmination of physical world with the cyber world. A lot of literature in the recent past has optimized the performance of Health Monitoring in terms of energy conservation, energy harvesting,   path and latency optimization. The major work in the Health Monitoring related to MAC and network layer issues. In order to take the advantage of Health Monitoring, to create a robust Cloud infrastructure routing protocols in the wsn need to be revisited. The performance of Ehealth monitoring with fault tolerance in cloud, health monitoring with fault tolerance in cloud, SEP, Health Monitoring with low energy aggregation protocols has been evaluated in terms of important performance metrices like throughput, dead nodes, energy consumption, and packet transmitted to base station. In doing so, the performance of Ehealth monitoring with fault tolerance in cloud was found to be better. After Ehealth monitoring with fault tolerance in cloud, health monitoring   with fault tolerance in cloud performed better

than SEP and Health Monitoring with low energy aggregation.

3.3 OBJECTIVES

The routing protocol health monitoring with fault tolerance in cloud is going to reduce the energy consumption but dense network is not considered. In order to solve the problem, we will consider network in case of health monitoring with fault tolerance in cloud. The overall mechanism is described as under:

- To study various energy efficiency technique used in Health Monitoring
- To study NFL (Neuro Fuzzy Logic) in a Distributed Energy-Efficient Clustering protocol.
- To propose a new NFL based technique which will transmit packets based on prioritywhile using a shortest path strategy.
- To fine tune the proposed technique for optimization of the energy consumption.

CHAPTER 5

RESULTS AND DISCUSSIONS

At first we consider a wireless sensor network with N= 100 Nodes arbitrarily distributed in a 50mx50m field. Without losing speculation, we expect that the base station is at the focal point of the detecting locale. In this examination, we overlook the impact caused by flag crash and obstruction in the wireless channel. The radio parameters taken up in the examination are appeared in

Parameter	Value
E_{elec}	5J
$\in_{fs}$	5 bit/ m2
$\in$	0.0012 pJ/ bit/ m2
E_0	0.5 J
E_{DA}	5 J/ bits/ Message
d_0	50 m
Message Size	4000 bits
P_{opt}	0.1
$E_{Threshold}$	E0/4

Table 4.1:- Simulation Metric

- It is seen that when the proposed result will be compared with the existing protocols results such as health monitoring with fault tolerance in cloud and PROPOSED, the proposed result will be much better than the existing results. In the proposed area 50*50 and distance at d^2, the number of packets transmitted to the base station is much more than the existing approach. In case of the dense area, congestion is reduced and more packets transmitted to the base station.

- Energy Consumption is the term which refers to the energy which is used by each node in order to

complete its execution. The energy consumption should be minimized for optimal results. Dense network Simulation conducted in MATLAB produced significant difference in energy consumption. Hence proved worth of the study.

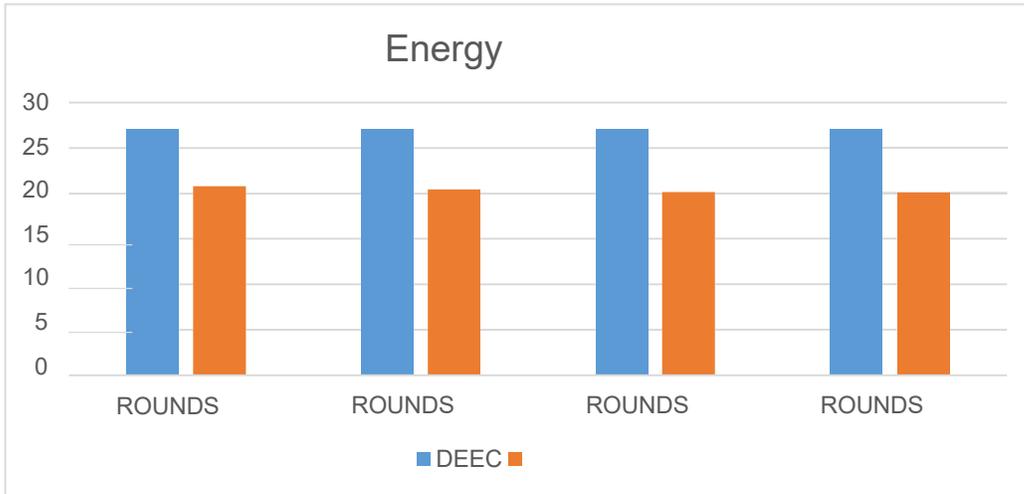**Table 4.2: Energy Consumption at d^2 50*50 area.**

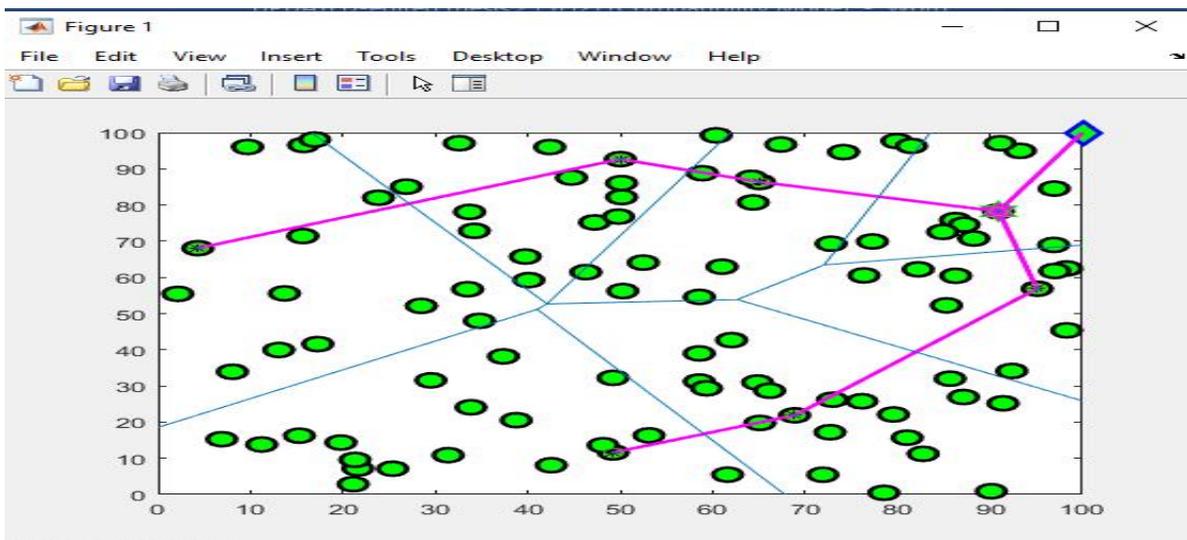**Figure 4.3: Energy Consumed at d^2 50*50 area**
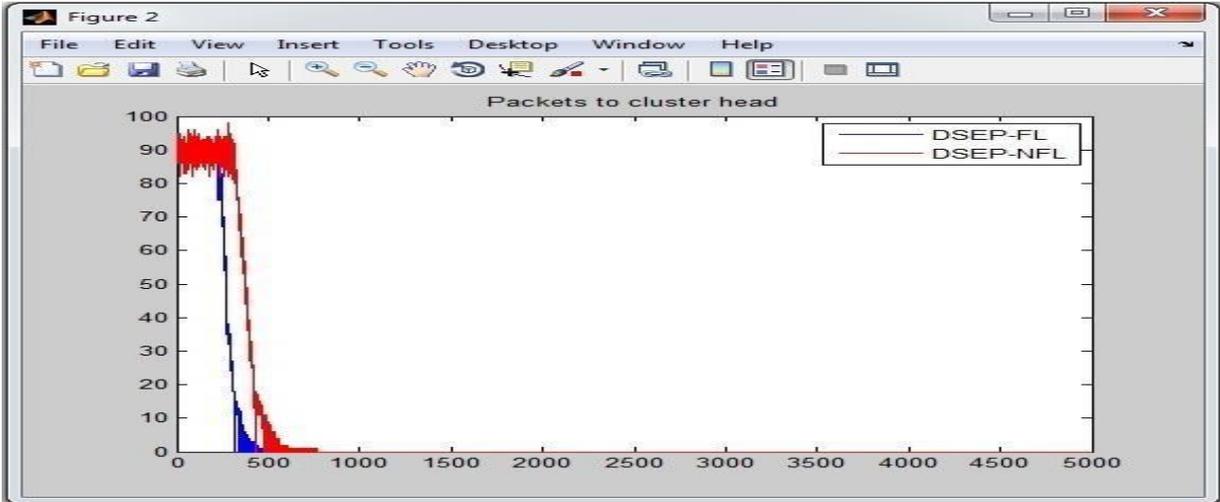

Figure 4.4 : Nodes Structure

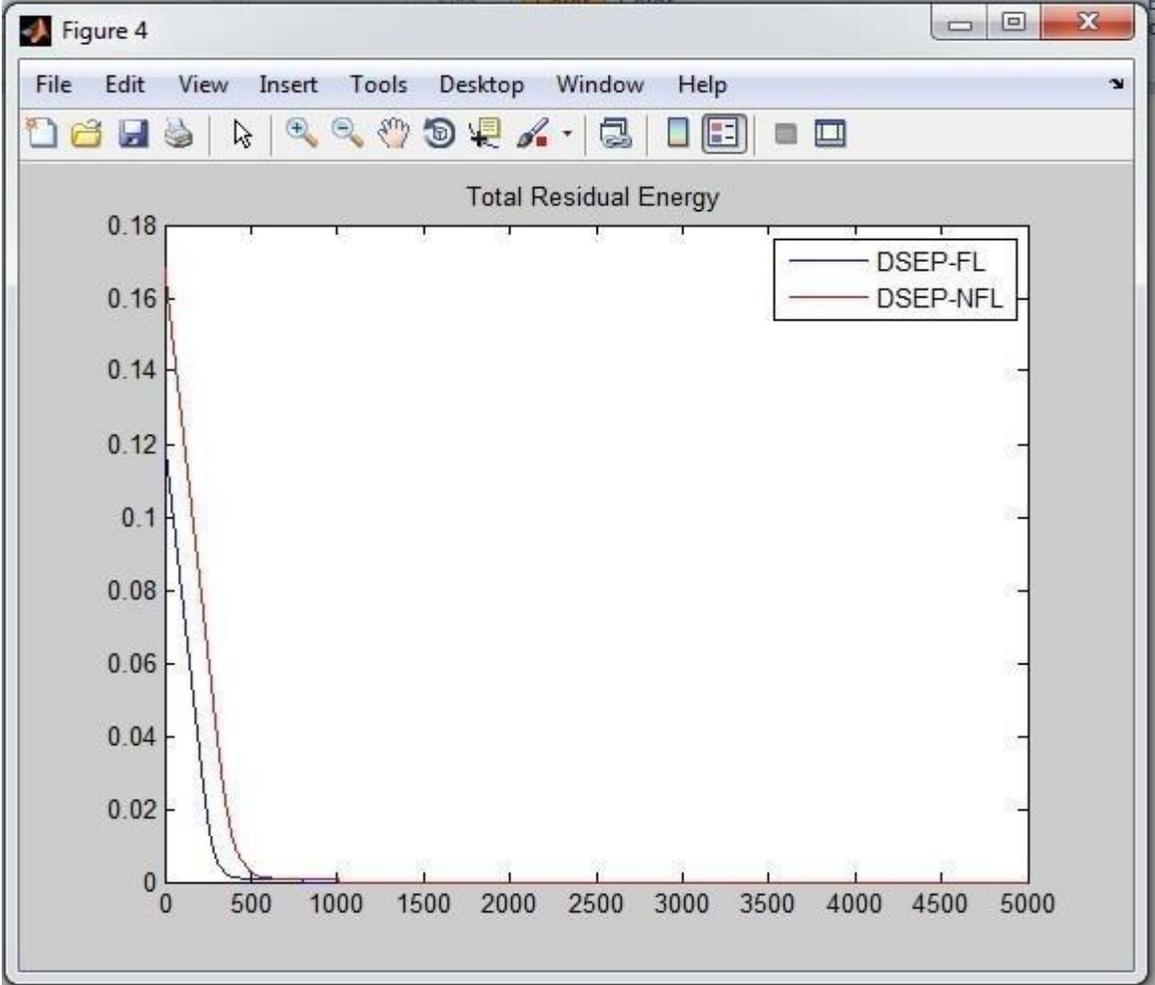**Figure 4.5: Packet To Cluster Head storing health information**

Figure 4.6: Total Residual Energy of virtual machine

Chapter 6

CONCLUSION

The proposed approach follows iterative approach of Modified Distributed energy efficient protocol for conserving energy of sensor uses the selection of cluster head. The cluster head selection involves multiple parameters including distance, energy and density of nodes. The cluster head selection process thus is multiheuristic in nature. The cluster head selection could be multiple by the application of proposed approach. Result obtained is given in terms of number of packets to base station, packets to cluster head, alive nodes and dead nodes. Proposed literature analysis performance of optimal energy aware routing protocols. proposed is found to optimal but health monitoring with fault tolerance in cloud can also be improved to match the performance with PROPOSED. In order to accomplish that dense network with square distance parameter is considered. Result has been improved in terms of energy consumption and number of dead nodes. In this report, we have suggested modified health monitoring with fault tolerance in cloud protocol with the priority queue in which number of data transmitted to the base station is more as compared to the existing health monitoring with fault tolerance in cloud. In the existing health monitoring with fault tolerance in cloud, priority queue is not taken so packet drop ratio is high and less messages transmitted.

Chapter 7
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