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A Survey Paper on WSN Based Green Computing

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***Abstract* -Green computing concept is to improve environmental condition. The main aim of green computing is to reduce toxic materials. We systematically analyze its energy consumption which is based on types of services and obtain the conditions to facilitate green cloud computing to save overall energy consumption in this system. We can implement green computing in computer's fields as CPU servers and other peripheral devices (mobile devices). By using green computing we can reduce resources consumption and disposal of electric waste (e-waste). In this paper, we will elaborate comprehensively survey the concepts and architecture of green computing, as well as its heat and energy consumption issues. Their pros and cons are discussed for each green computing strategy with its friendly approach towards atmosphere. Green computing can facilitate us to safe, secure place and healthy environment all over in the world. This paper will help us to take some initiatives currently under in the field of computers/electronics industry and new ways to save vast amounts of energy which is wasted in very large scale.**

Keywords -Green Computing, Wireless sensor network, peripheral devices, Mobility, Communication

I. INTRODUCTION

THE green computing technologies can reduce energy consumption. The temperature of global world is increasing very quickly. There are many factors but computers/electronics industry causes over emission of greenhouse gas and use much energy consumption which is the main root cause of current global warming. The energy consumption may be reduced by introduction of green computing. We can prepare and manufacture such devices which take low energy, give out low heat and gases. Air stream, weather, medicine, transportation, agriculture uses machines which take much amount of power, money and consumption of energy. It has been seen that there are three main areas which affect our daily life, air which we breathe, water which we drink and food which we eat and the soil on which we live. The data centers use a large amount of power/energy and release a lot of amount of heat and gases. In our daily life we use AC's, Refrigerators, UPS and computers. These items take a large amount of energy and evolve heat and gases. These gases are very harmful our lives. It has been seen that AC and refrigerators release CFC type gases. The battery of inverters release also harmful chemicals like lead. It causes lungs type diseases like cancers, asthma. The large amounts of heat destroygreenhouses gases like CO2 which create global warming. Large amounts of heat create floods, melting of glaciers, drought and increase the temperature of the earth. Many companies are trying to resolve these problems. Companies are trying to establish such devices which can take low consumption of energy and release low amount of heat [11].

II. LITERATURE REVIEW

In the year 2012 R.Yamini ―Power Management in Cloud Computing Using Green Algorithm‖ The greatest environmental challenge today is global warming, which is caused by carbon emissions. Energy crisis brings green computing, and green computing needs algorithms and mechanisms to be redesigned for energy efficiency. Green IT refers to the study and practice of using computing resources in an efficient, effective and economic way. The various approaches of the green IT are Virtualization, Power Management, Material Recycling and Telecommuting. The basic principles of cloud computing is to make the computing be assigned in a great number of distributed computers rather than local computer or remote server. In fact, cloud computing is extend of Grid Computing, Distributed Computing and Parallel Computing. Thus, it is necessary to significantly reduce pollution and substantially lower energy usage. The analysis of energy consumption in cloud computing consider both public and private clouds. Cloud computing with green algorithm can enable more energy-efficient use of computing power[2].

In year 2010 PriyaRana―Overview of the concept of Green Computing and how we can adopt it in our daily life to improve the deteriorating environmental conditions and how to adapt to sustainable .The understated data gives a basic computing. Green computing or green IT, refers to environmentally

sustainable computing or IT whose goals are to reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste. Green Computing concentrates on energy efficiency, reducing resource consumption and disposing of electronic waste in a responsible manner. Green computing is the environmentally responsible use of computers and related resources. Such practices include the implementation of energy-efficient central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste). Computers today have become a necessity not only in offices but also at homes. Superficially, this can be called as Green Computing. In a deeper sense, Green Computing is the study which lays stress on the operation of computers and related peripherals in order to minimize the carbon footprint. Green computing strategies can help us to build a safe place for us to live in .If each one of us becomes successful in constructing a healthy environmental balcony for ourselves then trust us we can together make our mother earth a healthy and a happy place for us to survive here[2].

In year 2012 S.V.S.S. Lakshmi — Green computing, the study of efficient and eco-friendly computing resources, is under the attention of environmental organizations, and businesses from other industries. In recent years, companies in the computer industry have come to realize that going green is in their best interest, both in terms of public relations and reduced costs. This paper presents at several green initiatives currently under way in the computer industry, as well as issues that have been raised regarding these initiatives and presents a study with an example to learn more about the future of green computing[3].

Green computing or green IT, basically concerns to environmentally sustainable computing or IT. The field of green computing is defined as "the knowledge and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—which include printers, monitors, and networking, storage devices and communications system efficiently and effectively with minimal or no impact on the environment. This computing is similar to green chemistry that is minimum utilization of hazardous materials and, maximizing energy efficiency during the product's lifetime, and also promote the recyclability or biodegradability of defunct products and factory waste [4].

Green computing is raising energy costs and potential savings. Energy to manufacture, store, operate, and cool computing systems has grown significantly in the recent years, primarily due to the volume of systems and computing that companies now heavily rely upon. This paper describes about history of green computing, need of the green computing and future of the green computing. The primary objective of such a program is to account for the triple efficiently bottom line [5].

In today's eras the most every person is using computer. Every office is computerized and everyoneuses the computer for their own purpose. But no one is aware but the harmful effects of the computer. The computes emit carbon dioxide harmful gases. The energy consumption by various computing devices is also plays a main role towards our harmful environment. This research paper analyzes the factors related to awareness of green computing among common man. It also includes a survey questionnaire which takes all the factors into account and before starting actual survey a pilot study for this questionnaire was done which confirm its acceptance [6].

A Dynamic Clustering-Based Algorithm for Wireless Sensor Networks, have discussed about energy aware Qos protocol for routing which are also efficient for best effort traffic . In this paper they explained how to improve first order energy efficiency by using dynamic clustering and to support Qos build multi-objective programming models [7].

III. GREEN COMPUTING

Green Computing is a recent trend towards designing, building, and operating computer systems to be energy efficient. The goals are to maximize energy efficiency during the product's lifetime, reduce the use of hazardous materials, and promote recyclability or biodegradability of defunct products and factory waste [10]. Such approaches include the implementation of energy-conserving central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste)The good news is that computer companies are talking about greenness and are touting green programs nowadays [1].

Even consumers are now becoming increasingly aware of green technologies and are starting to demand more environmentally friendly products in their homes and workplaces. In addition to saving companies in ongoing power consumption costs, thin client devices have a number of additional energy saving benefits when compared to traditional PCs. Because they have no moving parts, such as disc drives or fans, and emit very little heat, organizations also save in cooling costs; actual savings vary based on facility. Producing thin clients also requires significantly less energy and resources, as they contain fewer parts; are cheaper to transport because they are approximately 40 percent lighter; and last 50 percent longer, greatly reducing computer disposing cost.

This approach also encompasses the vehicle market. Automakers have been listening to the feedback and addressing consumer needs through cars that have better fuel economy, have lower emissions, and include natural materials.

A. Wireless Sensor Network

Wireless sensor networks are created by using connected wireless sensor nodes that each node is compact and have the ability of sensing, storing and processing the

environmental information as well as communicating with other nodes. Strong adaptability, High fault tolerance, and comprehensive sensing coverage are the main merits. These are some of the features which allow wireless sensor networks to be applied to a diverse range of applications, e.g. environmental monitoring, home, health care, battlefield surveillance, and so on. In recent times, WSNs have become a crucial space for research. In wireless sensor networks during communication process between the sensors nodes more amount of energy is consumed.

B. Desirable Features of Wireless Sensor Network

Some of the general characteristics of wireless sensor network are like:

i. *Scalability:* In some applications wireless sensor network can grow. The number of sensor nodes deployed in sensor is may be in the order of hundred or thousand.
ii. *Energy Consumption:* Most of the sensor use battery power as their energy source. Energy Consumption depend upon the three major operations of the sensor nodes which are sensing, communication and processing, power control, etc.
iii. *Security:* It must achieve all safety goals which are privacy, accessibility, reliability, verification, approval, non-denial.
iv. *Fault Tolerance:* Sometime a node may fail due to various reasons. Failure of nodes should not affect the overall performance of wireless sensor network.
v. *Data Gathering:* Data gathering is a task of collecting the data from sensors node and removing the redundant data. The information collected should be transmitted to the sink node or base station without loss.

IV. PROPOSED WORK

In order to achieve the green solution that optimizes the energy consumption in wireless sensor network the weighted clustering algorithm is proposed to implement.

1. *Remain energy* -The network devices in mobile WSN are created with limited energy. Additionally, if a node loses their energy frequently, then the node is not functioning as required. Thus it is required to make a cluster head with the higher energy or energy efficient node. Basically for each node event a significant amount of energy required. Thus remain energy is an essential parameter for clustering, that will be computed using the below given formula.

$$E = initialenergy - lostenergy$$

If the node energy is regulated according to the need thus the performance of network can be improvable in terms of energy consumption.

2. *Mobility* -Another property of node in ad hoc network is mobility. Low mobile nodes are able to form more stable clusters. Therefore the less relative mobility nodes are selected for cluster heads. Suppose a node has their initial position at time t_1 in network is (x_1, y_1) and after a time interval Δt or at the time t_2 that is change their position at (x_2, y_2). Therefore the change in position can be denoted by the length of straight line between point (x_1, y_1) and (x_2, y_2).

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Similarly the rate of change in position of a node with respect to the time can be computed using the following formula.

$$M = \frac{D}{\Delta t}$$

3. *Connectivity* -In the context of network, the nodes are said to be connected, if the nodes are in radio range of neighbour nodes. Thus Maximum numbers of nodes are termed here as the connectivity of node. In other words the degree of nodes is known as the connectivity of the node. This parameter is selected because the higher connective node can serve for all the connected nodes. During the further discussion this parameter is given using C. Thus number of one hop nodes is considered for approximating the node degree or connectivity.
4. *Buffer length* -In network and socket programming the nodes are first accept the data using the buffer and for collecting information from the network that again utilizes the buffer. If the allocated buffer size of the node is consumed by the node that means a node in a high processing load or it suffers from the congestion problems thus the node which having less filled buffer can serve better as compared to filled buffer node

Additionally to compute the weight for selection of the cluster head the following formula is incorporated.

$$W = w_1 * E + w_2 * M + w_3 * C + w_4 * B$$

In this weight calculation is performed by scaling the node performance parameters into a similar scale therefore $w1$, $w2$ … are providing the factors on with the nodes parameters are scaled. For constructing these factors the sum of these factors is required to be 1 and the distribution of these weights are between 0-1. After computing the weights for the all nodes the nodes are broadcast the weight information to their neighbour. The neighbours compare the weights to self-weight and other node's weights. The higher weighted node is selected as the cluster head for the specified time interval.

But in this computation some of the issues are occurred such as all the cluster heads are elected on same place therefore the concept of uniformly distribution of clusters are not achievable. Therefore the clustering is performed with a grid based clustering scheme. In this context the entire simulation area is sub-divided into a similar area grids and the algorithm is applied on the basis of their regional node's evaluation.

V. CONCLUSIONS

Due to simplicity and scalability, grid-based clustering has become an efficient sensor network communication and coordination scheme. In this paper we first propose an energy consumption model based on distance distributions instead of using the average distance. This model can be used in non-uniform grid-based clustering, which makes both the data traffic and energy consumption more balanced, and prolongs network lifetime. We also investigate the impact of non-uniformgridding with a grid size ratio through analysis and calculation, where the distance distribution models are used. Our analysis reveals the importance of grid-based clustering schemes and the optimal grid size ratio that can balance the overall energy consumption. The performance evaluation showed the capability of the distance models derived in this paper, and the potential of the non-uniformgridding scheme.

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