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A comparative study of cloud computing security models- Gaps and Opportunities

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Abstract:

One of the most promising solutions in development in the Information technology sector is attributed to the unprecedented growth in Cloud Computing which has made organizations technological worries a phenomenon of the past. Cloud computing acts as a means to maintain a flexible and scalable IT infrastructure that enables business agility for practicing managers who are trying to exploit the benefits of cloud computing for the efficient use of IT resources. Even though there are impending benefits arising out of cloud computing, there are a lot of risks and security concerns which are associated with it. This requires frequent security models being developed by cloud service providers to thwart the risks caused due to the vulnerabilities in the cloud. This research paper is an attempt to compare some of the existing cloud based security models and tries to find out the gaps existing in relation to the growing security concerns and tries to find out if there are any opportunities available to develop further measures to increase the security measures. Also a framework for a new model which can act as a replacement to the existing models which could make up for the gaps is attempted herewith.

Keywords—Cloud computing, Cloud Security models, vulnerabilities

Introduction:

The emergence of cloud computing has provided organizations with an opportunity of providing an array of on demand services in infrastructure, platform and software which are like the basic necessities of any IT enabled organizations. These services are designed in a way to cater to specific needs of customers of all sizes and capabilities. [1]. Software as a Service (SaaS) provided in the complete applications as a service such as CRM [2], whereas platform as a

service(PaaS), such as a Google App Engine (GAE)[3], and infrastructure as a service (IaaS) which is playing an important role in providing an environment for deploying, running and managing virtual machines and storage.

Cloud computing provides an avenue for small and medium enterprises who otherwise have to make high capital investment for procuring IT infrastructure, highly skilled resources for development purposes and system administrators because of which they end with a high cost of ownership. What cloud computing provides is an alternative where it aims to deliver a network of virtual services which can be accessed virtually from literally anywhere from the world on a pay- as –use basis at a very competitive cost based upon the specific requirements of the organizations [1]. This in a way has reduced the large scale capital requirements to a large extent and provides an opportunity for organizations to focus on their core competencies and also delivering their value for their customers. Due to these benefits the adoption of cloud computing and the usage has increased manifold causing more organizations to join the bandwagon of cloud computing. But these benefits cannot override the security challenges and risks associated with cloud computing. Organizations have been constantly developing security models to thwart the risks caused due to the challenges in the cloud environment. But since cloud is a open source technology, there are many vulnerabilities which are getting constantly exposed and provides an opportunities for external hackers as well as malicious insiders who get access in the cloud system and cause damages. This is an attempt to compare the security architecture of the existing models and their capabilities in challenging the risks and to find out if there are any gaps available followed by an attempt to list down the opportunities which can aide in development a comprehensive security model.

Cloud Computing and Security:

Cloud Security Alliance (CSA) which deals with cloud computing security has identified a set of 9 top threats named as ‘Notorious Nine’ which are:

1. Data breaches
2. Data loss
3. Traffic hijacking

4. Insecure interfaces and API's
5. Denial of Service
6. Malicious insiders
7. Cloud abuse
8. Insufficient due diligence
9. Technology vulnerabilities

Issues and Challenges:

Some of the major issues and challenges in cloud computing are Port Scanning, IP Spoofing, DNS poisoning and phishing.

- Packet Sniffing is an activity done by malicious users to analyze the data packets sent over a cloud.
- When a malicious user impersonates a legitimate users IP address to access information through the use of that IP address an IP Spoofing occurs.
- In case of the exhaustion of host servers which is caused by malicious users resulting in legitimate users not gaining access to resources, it results in a loss of cost to the company as well time. When external users can cause so much damage it is easy for internal users who are authorized to gain access to resources without being detected.
- An Insider has higher privileges and higher access with respect to network, security, mechanism and resources for them to attack and cause more damage than caused by an external users.

Vulnerabilities in the cloud:

Some of the major cloud specific vulnerabilities are

- Insecure Interfaces and Application Programming Interfaces
- Malicious Insiders
- Virtualized Technology
- Data Loss or Leakage
- Account or Service Hijacking

- Unknown Risk Profile
- Session Riding and Hijacking
- Virtual Machine Escape
- Reliability and Availability of Service
- Insecure Cryptography
- Data Protection and Portability
- Vendor Lock In

Security Concerns:

Some of the major security concerns with the cloud are given below:

- Legal issues due to laws of the land.
- Incompatibility of one provider's access controls to another in case of transfer[9].
- Ownership issues related to the encryption keys
- Integrity of the data.
- The level of data which can be stored and the time period it can be stored.
- The issue of physical control of cloud security being compromised.
- Fluidic nature of virtual machines.
- In case of Payment Card Industry Data Security Standard (PCI DSS) data logs must be provided to security managers and regulators. [10][11][12]
- It is imperative for users to keep them up to date with application improvements to be sure they are protected.

Cloud Security Models:

The cloud based models which are taken for consideration are

- 1) Vormetric Data Security Platform
- 2) Trend Micro Secure Data
- 3) Open VPN server
- 4) AWS EC2-Classic network
- 5) IETF IP Security Architecture (IPSec)

1. **Vormetric Data Security Platform:** The Vormetric Data Security Platform is built on an extensible infrastructure and features several products that can be deployed individually, while offering efficient, centralized key management. These products deliver capabilities for transparent file-level encryption, application-layer encryption, tokenization, cloud encryption gateway, integrated key management, and security intelligence logs. Through the platform's centralized key management and flexible implementation, it enables users to address security policies and compliance mandates across databases, files, and big data environments—whether assets are located in the cloud, virtual or traditional infrastructures. With this platform's comprehensive, unified capabilities, users can efficiently scale to address your expanding security and compliance requirements, while significantly reducing total cost of ownership (TCO).

Key Attributes:-

The key attribute of this solution is

- Low total cost of ownership
- Maximizing staff and resource efficiency
- Strengthening security compliance

2. **Trend Micro Secure Data:** Trend Micro Secure data helps to ensure compliance with data protection solutions built into a unified, centrally managed framework powered by the Trend Micro™ Smart Protection Network™. Enterprise Data Protection secures data from gateway to mobile devices by integrating a full set of data security products within your existing Trend Micro enterprise security suite. By combining threat and data protection in a flexible, centrally-managed solution, it lowers the cost and effort to deploy and manage while closing critical security and compliance gaps—for complete end user protection.

Enterprise Data Protection product set includes:

- Trend Micro™ Integrated Data Loss Prevention
- Trend Micro™ Mobile Security
- Trend Micro™ Endpoint Encryption
- Trend Micro™ Email Encryption Gateway

3. Open VPN server: OpenVPN Access Server is a full featured secure network tunneling VPN software solution that integrates OpenVPN server capabilities, enterprise management capabilities, simplified OpenVPN Connect UI, and OpenVPN Client software packages that accommodate Windows, MAC, Linux, Android, and iOS environments. OpenVPN Access Server supports a wide range of configurations, including secure and granular remote access to internal network and/ or private cloud network resources and applications with fine-grained access control.

4. AWS EC2-Classic network :

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates the need to invest in hardware up front, so organizations can develop and deploy applications faster. Amazon EC2 can be used to launch as many or as few virtual servers as needed, configure security and networking, and manage storage. Amazon EC2 enables options to scale up or down to handle changes in requirements or spikes in popularity, reducing the need to forecast traffic.

Amazon EC2 provides the following features:

- Virtual computing environments, known as *instances*
- Preconfigured templates for your instances, known as *Amazon Machine Images (AMIs)*, that package the bits you need for your server (including the operating system and additional software)
- Various configurations of CPU, memory, storage, and networking capacity for your instances, known as *instance types*

- Secure login information for your instances using *key pairs* (AWS stores the public key, and you store the private key in a secure place)
- Storage volumes for temporary data that's deleted when you stop or terminate your instance, known as *instance store volumes*
- Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as *Amazon EBS volumes*
- Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as *regions* and *Availability Zones*
- A firewall that enables you to specify the protocols, ports, and source IP ranges that can reach your instances using *security groups*
- Static IP addresses for dynamic cloud computing, known as *Elastic IP addresses*
- Metadata, known as *tags*, that you can create and assign to your Amazon EC2 resources
- Virtual networks you can create that are logically isolated from the rest of the AWS cloud, and that you can optionally connect to your own network, known as *virtual private clouds* (VPCs)

5. IETF IP Security Architecture (IPSec) :

IPsec is designed to provide interoperable, high quality, cryptographically-based security for IPv4 and IPv6. The set of security services offered includes access control, connectionless integrity, data origin authentication, detection and rejection of replays (a form of partial sequence integrity), confidentiality (via encryption), and limited traffic flow confidentiality. These services are provided at the IP layer, offering protection in a standard fashion for all protocols that may be carried over IP (including IP itself). IPsec includes a specification for minimal firewall functionality, since that is an essential aspect of access control at the IP layer. Implementations are free to provide more sophisticated firewall mechanisms, and to implement the IPsec-mandated functionality using those more sophisticated mechanisms.

Based upon the analysis of the usage of these existing models, the following are the drawbacks or the missing GAPS in these models. These Gaps are what provides an

opportunity for a better security model which will take case of these and provides scope for better data security in a cloud based environment.

PARAMETERS	GAPS				
	VORMETRIC DATA SECURITY PLATFORM	TREND MICRO SECURE DATA	OPEN VPN SERVER	AWS CLASSIC	IETF IP SECURITY ARCHITECTURE (IPSEC)
FIREWALL SECURITY	Does Not Provide	Does Not Provide	Encrypt data in transit using PKI – Certificates between AWS VPC and other Network	An EIP is disassociated from your instance when you stop it.	Can be Implemented
HOST LEVEL ACCESS CONTROL	Does Not Provide	Does Not Provide	Require a dedicated EC2 Instance with hourly charges.	Separate subnet creation is not possible	Not available
NATTING FACILITY	Does Not Provide	Does Not Provide	2 Factor authentication is provided	Does Not Provide	Does Not Provide
COST OF OWNERSHIP	License Model very high	License Model very high	Requires separate Public IP	Public IP is required to access Internet , there by exposing the instance to world	very high
TIME OF IMPLEMENTATION	More Time Required	More Time Required	More Time Required	Normal Time Required	More Time Required

Proposed Model:

The model here proposed will have the following additional features which are being missed in the existing security models in cloud computing.

1. Providing Host access Control at all levels.
2. Providing a Public IP is not mandatory for Internet access, and it can be accessed through NAT Instance which acts as Gateway.
3. Providing Natting facility with NAT instances
4. Options to create separate subnets in VPC
5. Providing data-at-rest encryption.
6. Providing comprehensive firewall security through Security Group & Network ACL's
7. Providing minimal cost of ownership by not using a license based subscription model
8. Reduced implementation time
9. To provide data in transit encryption using SSH because of which all data traffic can be routed through SSH Tunneling.
10. Should not be requiring additional Instance for every activity. NAT instance doubles up as SSH Gateway point from where tunneling can be done to other instances.

Thus if we are able to develop a comprehensive model which includes these suggested features it will be most beneficial for Small and Medium enterprises who are apprehensive about exploiting due to the cost of ownership as well the growing scale of vulnerabilities and the risks involved in using them. This paper is not an attempt to find the pitfalls in the models being in existence but an attempt to explore additional opportunities which if taken care would increase the usage of cloud among the stakeholders.

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WSN Lifetime Enhancement using AEC Algorithm

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Abstract - A wireless sensor network (WSNs) is composed of sensor nodes having a set of processor and limited memory unit embedded in it. The most important task for such network is to provide reliable routing of packets from the sensor nodes to its base station. In Wireless Sensor Networks, routing is much more complex than other wireless networks. In WSN routing strategy should be energy efficient. This survey paper gives an overview of the different routing protocols used in wireless sensor networks and gives a brief working of energy efficient routing protocols in WSN. This study presents the comparison among different routing protocols based on various parameters towards the energy efficiency for WSNs.

Keywords - Wireless sensor networks, Gateways, Routing protocols, Energy efficiency, Network lifetime

I. INTRODUCTION

The basic suggestion of anytime and anywhere computing leads to the new field called mobile computing. The major stimuli for the growth of mobile computing are due to advancement in wireless technology. The improvement in wireless transmission techniques lead to the development of the WSN. A wireless Sensor network includes various application areas like environment monitoring, military applications and context aware computing environments etc.

All the sensor nodes are battery powered devices, and energy consumption of these nodes affects the life-time of the entire network during transmission or reception of packets. Presently a number of energy efficient routing protocols have been developed like LEACH protocol, PEGASIS protocol etc. These protocols have achieved efficiency for static sensor network only. This paper presents the survey on energy efficient routing algorithms and protocols in Wireless Sensor Networks (WSNs). The section II describes the existing routing protocols in WSN and

section III gives an overview of energy efficient routing protocols like LEACH, PEGASIS, HEED, and DECA. The section IV concludes our paper with the future direction in WSNs.

II. ROUTING PROTOCOLS IN WIRELESS SENSOR NETWORKS

A There are number of routing protocols have been developed for wireless sensor networks. These protocols have been characterized based on its constraints in the processing power and limited battery power. These protocols fall under following three categories: 1.Direct approach, 2. Location based routing, 3.Data centric routing. The classification of WSN routing protocols is shown in figure1.

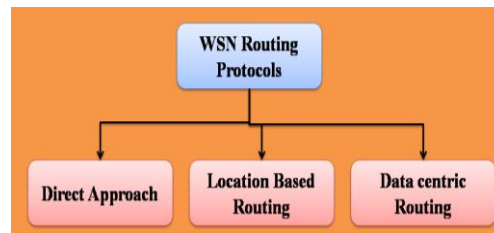


Figure 1: Routing Protocols in WSN

2.1 Direct Approach:

The Direct approach routing protocols are simple flooding type routing protocols which are easy in its implementation but not an energy efficient protocol for the sensor networks. However in Location based routing protocols the base station communicates with sensor nodes based on its locality information. All the nodes are conscious of their location through GPS (Global Positioning System) receivers in the network. Data centric based routing uses the information gathering technique and collect information from the sensor nodes which satisfies its interest. Direct diffusion and rumor routing are the examples for data centric approach based routing.

2.2 Location Based Routing:

Location based routing involves the routing of data to the nodes by the geographic location of the nodes (i.e.) nodes are identified by its location only. The low power GPS receivers are

embedded in sensor nodes to obtain the location information of the individual nodes in the network. Numerous "Location based routing" are

- Greedy approach
- Compass routing
- DREAM
- GPSR
- GEAR

2.2.1 Greedy approach:

In [1] I. Stojmenovic et al. stated that the node Y is the inter-mediate node nearer to the node D from the source or intermediate node S, sends the data packet to the destination D. The data packet flows through the intermediate nodes as shown in following figure 2 until it reaches to the destination node D.

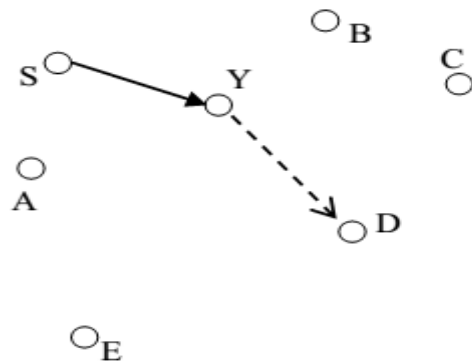


Figure 2: Greedy approach

2.2.2 Compass routing:

In [2] E.Kranakis et.al stated that the S is the source node which calculates the direction of the destination D and the neighboring node Y which is having closest direction to the destination than S. As shown in figure 3, D is selected as the next eligible intermediate node to route the data from the source node.

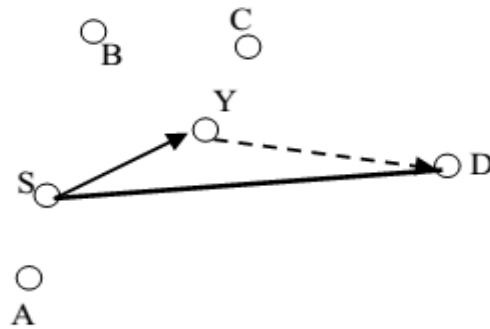


Figure 3: Compass routing approach

2.2.3 DREAM [A distance Routing Effect Algorithm for Mobility]

In [3] S.Basangi considered the model of flooding packets to all the neighboring nodes of node x, here a different approach was considered. The data is only flooded to the limited number of nodes under the area of tangents from source node S to the circle centered at destination D as shown in figure 4. Since data has been forwarded to limited number of nodes, so this scheme gives better transmission of data than its predecessors schemes.

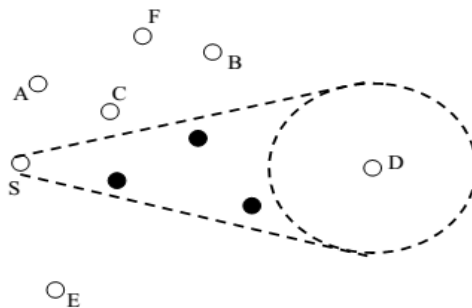


Figure 4: Routing structure in DREAM protocol [3]

In the Figure 4 source node S receives data messages towards area dotted nodes under the tangents connecting the circle.

2.2.4 GPSR [Greedy Perimeter Stateless Routing]

Greedy perimeter stateless routing is the modified version of greedy-face-greedy algorithm [4]. GPSR uses the combination of two approaches; greedy approach and perimeter approach. In the beginning the data is forwarded by using greedy approach and if the packet gets jammed at

any point in the network, then only perimeter approach is used. The main point in this protocol to be noted is that perimeter approach is continued till a node closer to the destination is found than the node at which the data packet got jammed. It ensures the guaranteed delivery of packets to the destination node.

2.2.5 GEAR [Geographic & Energy Aware Routing]

In [5] Y.Yu et.al considered the least cost path to route the data packets to the destination node identified through its location information. GEAR routing used the different approach than its previous routing protocols.

2.2.6 GAF [Geographic Adaptive Fidelity]

In [6] Y.Xu, D.Estrin et. al proposed that all the nodes will be associated with a particular grid coming under the particular geographical range. For the nodes which are under same grid network have the same communication cost. During the routing decision any one node from the particular grid will awaken and takes part in routing; while rest of the nodes in the same grid will remain inactive to avoid needless energy diminution.

2.3 Data centric routing

A wireless sensor network can be different from the other wireless networks in terms of address of the node and the content of the node. The Location based routing utilizes the entire sensor nodes in the particular region as the whole system rather than as the individual nodes. This concept leads to Data centric routing in sensor network; where routing decisions is based on content of data held by the nodes in the network rather than their locality information. Following are some of data centric routing protocols,

- Directed diffusion
- SPIN
- Rumor routing

2.3.1 Directed Diffusion

In direct diffusion [7] the data generated in the nodes is identified by its attribute-value pair. At first, the base station discharges the data packet of “interest” throughout the network. The issued user interest is compared with the event record in the concerned node while flooding throughout the network. If the event record matches with the packet of “interest” is sent to the base station otherwise the “interest” is passed to the nearest nodes. In the direct diffusion technique, the use of gradients is an important factor. The base station have to select the gradient having least delay time than others whenever the source node is responding to the base station during the receiving of data from multiple routes. The Directed Diffusion technique uses fundamental essentials are,

Interest propagation: This assignment is represented by the attribute value pair and diffused through the network.

Data propagation: This assignment is represented when the user “interest” matches with the event record, the data are forwarded back to the base station.

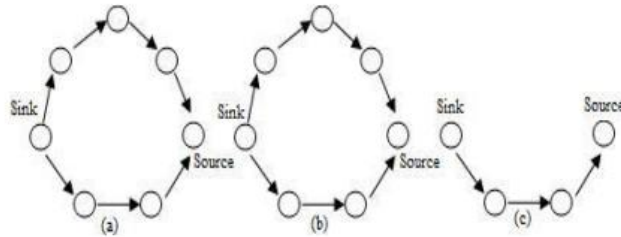


Figure 5: Directed Diffusion- (a) Interest Propagation, (b) gradient formation and (c) selection of optimum return path. [7]

2.3.2 SPIN

SPIN protocol stands for “Sensor Protocols for Information Negotiation” [8]. It is a protocol based on data centric approach. It involves three subsequent steps in data transformation between the nodes; and hence called as the three-stage protocol. At first stage, node generates information which is closely acquainted to its one-hop neighbors using ADV (advertisement) packet as shown in figure 6. At second stage, if the neighbor node needs of the information then it requests the data through REQ (request) packet. At last third stage, the original DATA packet will be sent to the neighbor node. SPIN protocol removes redundancy of data packets from the sensor

networks. The disadvantage of this routing method is that if a node which is in need of the data can't receive the data when it is not coming transmission range of one-hop neighbor node to the source node which generates the data packet.

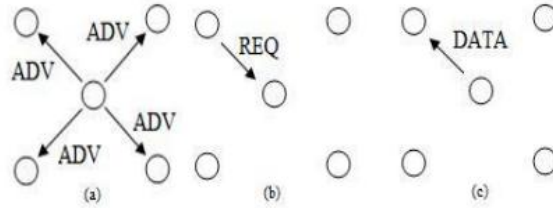


Figure 6: SPIN Protocol-(a) Data advertisement (ADV), (b) request (REQ) and (c) transferring of original DATA

2.3.3 Rumor routing

As in previous method base station is the initiator which gathers the information of data. Another approach could be adopted where the source node may act as the initiator in passing sensed data to the base station; and this approach is called as the rumor routing [9]. In Rumor Routing approach sensor nodes collect the information i.e. sensed data which is sent to its neighboring nodes till it reaches the concerned region of the network.

I. RELATED WORK IN ENERGY EFFICIENT ROUTING

These Wireless sensor networks have several issues to consider; energy efficient routing is one of those. Many researchers have proposed various methods to perform energy efficient routing in WSN. Whenever sensor nodes transmit data, their battery power gets reduced and hence we can say that data transmission in wireless communication takes more power than data processing. We can use data fusion or aggregation techniques to reduce the data size. Data fusion technique is one in which the sensed data are fused at certain point from different nodes suitable for the transmission in its reduced size. Data aggregation techniques are of two types. The first type of data aggregation technique fuses the data collected from different sources and sends the final fused data in reduced size. This approach has limitation that it is deficient in accuracy and precision of data from various sensor nodes. The second type of data aggregation technique merges the data to form single unit from different sources under the single header and forwards it to the base station. This approach consolidates the header packets and passes it to the base station

without any modification to the original data from the sensors. This improves the accuracy and precision. WSN Energy efficient routing is classified based on two approaches:

- Clustering approach
- Tree based approach

3.1 Clustering approach:

The approach of dividing the networks into small controllable units is called as clustering. The clustering technique advances the scalability of network through ease of implementation and results energy efficient routing within the sensor networks. The clustering approach has some other advantages also like conserving communication bandwidth, avoiding redundant message transfer, localizing energy efficient route setup etc. LEACH, HEED, DECA, etc. are the energy efficient routing protocols based on clustering technique.

3.1.1 LEACH:

LEACH stands for Low energy adaptive clustering hierarchy [10]. It uses the clustering technique to distribute the energy consumption beside its network. LEACH protocol divides the network in the form of cluster heads and clusters to gather the data packet information. The cluster heads do get together with cluster nodes to collect the data information. Each round of LEACH protocol performs following steps:

Advertisement phase: It is the first step. The cluster head issues a notification to the nodes to become a cluster member in its cluster within its transmission range. The nodes recognize the information based upon the Received Signal Strength [10].

Cluster set-up phase: Nodes within cluster respond to their cluster heads.

Schedule creation: After receiving reaction from the cluster nodes the cluster head (CH) construct TDMA scheme and send it back to cluster node member to intimate them when they have to pass their information to it [10].

Data transmission: The data collected by the individual sensors will be transmitted to the cluster head during its time interval and on all other time the cluster members radio will be off to reduce its energy consumption [10].

In LEACH protocol cluster head (CH) is responsible for collecting data from its cluster members and fuse it. Finally each cluster head will be forwarding the fused data to the base station. This protocol solves the problem of multi cluster interference problem by using unique TDMA scheme for each cluster. This protocol also helps to avoid energy depletion for the same sensor nodes which has been elected as the cluster leader, using randomization for each time cluster head would be changed. LEACH protocol has shown a considerable improvement when compared with its other energy efficient protocols [10].

3.1.2 HEED:

The main drawback of LEACH protocol is the random selection of cluster head nodes. In worst case scenario the CH nodes may not be uniformly distributed among the nodes which may affect on the data gathering process. A new algorithm called HEED [11] (Hybrid Energy Efficient Distributed clustering approach) was developed to avoid the random selection of CHs which selects the CHs based on both residual energy level and communication cost. This protocol executes three phases:

Initialization phase: Initialize CHs nodes along with other nodes in percentage. It is represented by the variable Cprob. Each sensor node computes its probability to become CH by, $CHprob = Cprob * E_{residual} / E_{max}$

Where, $E_{residual}$ is residual energy level of node, E_{max} is maximum battery energy. Because this approach supports heterogeneous property of network of sensor nodes; E_{max} may vary for different nodes according to its functionality and capacity.

Repetition phase: This phase is iterated till the CH node is found with the least transmission cost. If the node cannot locate the suitable CH, then the apprehensive node itself selected as the cluster head.

Finalization phase: The selection of CH is finalized at this phase. The provisional CH now becomes the final CH node.

3.1.3 DECA:

DECA stands for Distributed Efficient Clustering Approach [12]. In DECA nodes take the decision and the score computation value. DECA involves following phases:

Start Clustering: Initialize all the nodes to compute its score using following equation.

$$\text{Score} = w_1E + w_2C + w_3I$$

E is the residual energy, C is the node connectivity, and I is the node identifier. After some interval of time the Score value computed with respect to the neighboring nodes with the node ID and cluster ID.

Receive Clustering Message: When the receiving node has higher Score value higher than it, then it is not attached to any cluster accepts the sender node as its CH.

Actual announcement: In this phase all the nodes are broadcasted with CHs ID, cluster ID and score value.

Finalize Clustering: This phase is same as HEED protocol that the provisional node with its cluster head is finalized for all other nodes.

3.2 Tree Based Approach:

Another way of energy efficient routing in WSN is tree based approach. In this approach a hierarchical manner of tree structure is formed with aggregation points. The leaves are the source nodes and the root is the sink node. In this literature survey we are discussing with only one and popular tree based approach protocol named as PEGASIS protocol.

3.2.1 PEGASIS:

PEGASIS stands for "Power Efficient Gathering in Sensor Information System" [13]. This is the improved version of LEACH protocol by forwarding the data packets to only one neighbor of the node. It forms a chain structure towards the base station and data packets would be forwarded to this BS node in hierarchical manner.

Table 1 Comparison of the protocols in terms of its related parameters data.

Protocols	Distributed Cluster Heads	Cluster Stability	Mobility support	Latency in Sensor Network
Direct Approach	N/A	N/A	NIL	LOW
Direct Diffusion	N/A	N/A	NIL	HIGHER
Rumor Routing	N/A	N/A	NIL	ACCEPTABLE
LEACH	MODERATE	MODERATE	NIL	ACCEPTABLE
HEED	GOOD	GOOD	NIL	ACCEPTABLE
DECA	GOOD	GOOD	NIL	ACCEPTABLE
PEGASIS	N/A	N/A	NIL	HIGHER

In PEGASIS collected data is merged and the merged data will be forwarded to its one hop neighbor directly. It achieves the energy efficiency because all the nodes are performing the data fusion at its place there is no quick reduction of power for the nodes available near the Base station. Every node gets a chance to forward the gathered data to the base station. Whenever the sensor node measurements are aggregated to be a single packet, then only fraction of the data generated by the sensor is given to the base station where the collective stuffs of data are present in the root node and the better-quality data can be achieved by further tree traversal algorithms.

Although the Directed Diffusion [14] and Rumor routing [15] techniques are also tree based approach in terms of energy efficiency but it lacks behinds compared with PEGASIS protocol. Following table1 represents the comparison of energy efficient routing protocols in terms of related parameters for WSN.

IV. CONCLUSION & FUTURE WORK

In this literature survey, the existing routing strategies in the wireless sensor networks (WSNs) and their corresponding protocols has been explained. “Discovery consists of seeing what everybody has seen and thinking what nobody has thought”. Although all the protocol mentioned

above are proved to be energy efficient than its previous protocols, but all these protocols assume the nodes to be static and stationary. Further the comparative analysis among these energy efficient routing protocols has been stated. Future works may concentrate on achieving better energy efficient routing mechanism for wireless sensor nodes with mobility.

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BIOMETRIC PARAMETERS TO IDENTIFY HUMAN AND EXISTING LIMITATIONS

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Abstract— Biometrics is a rapidly evolving technology, which refers to the automatic identification of a person based on his/her biological characteristics such as finger scan, retina, iris, voice, and signature scan etc. The main purpose of this system is to allow access only to an authorized and legal user. Major application area involves workstations, ATM's, airport, hospital; personnel security etc. This paper involves discussion about the advantages and limitations of tremendous biometric techniques.

KEYWORD: *Biometrics; security; verification; identification.*

I. Introduction

Biometrics is a union of two words bio (life) and metrics (measure)[2]. This method of identification is preferred over traditional methods involving PIN numbers and password for particular reasons: the person to be identified should be present at that time; identification based on biometric techniques eliminates the need to carry a token or remember the password. With the increased use of computers in the field of information technology, it is mandatory to restrict access to personal/sensitive data. By replacing PINs, biometric techniques can prevent unauthorized access. An important issue is designing how an individual is identified [3]. Depending on the above context, a biometric system can be of the following two types which can be defined as:

Identification System: This system involves identifying a person from all biometric measures recorded in a database and this can be referred as one-to-many match or open search."The question it seeks is Do I Know, Who you are[3]?

Verification System: This process involves authenticating a person's claimed identity from his or her previously present pattern and can be termed as one-to-one match or closed search. The question it seeks to answer is, "Are you claim to be?"[3]

TABLE I

Characteristics	Fingerprint	Retina	Iris	Face	Voice
Ease of use	high	low	med	med	high
Accuracy	high	high	high	high	High
User Acceptance	med	med	med	med	High
Long Term Stability	high	high	high	med	med

a. Characteristics Feature of Biometric Technology[1].

II. Working

The major task of Biometric systems is to record and compare certain biometric characteristics. When an individual uses a biometric system for the first time, their identifying features are recorded as a reference for future comparability and this is called enrollment process [3]. Verification and Identification is the major task of the general biometric system. Following process is involved during the identification and verification process.

1. A Biometric sensor acts an interface between the system and the real world. It is capable of acquiring all the mandatory data.
2. In the next step, pre-processing is done. For ex: To cut out background noise from the sensor to improve the input.
3. In the third step, all important features are extracted in the best way.
4. Now, a template generator is used to extract various characteristics from the source, an image with certain properties is used to create a template.
5. During the enrollment process, the template is stored either in a card or database or both. And during the matching process, the template obtained is passed to the matcher. The purpose of matcher is to compare the templates with the existing one.
6. Thus, at the final stage, required output is generated which can be used for any specific purpose [4].

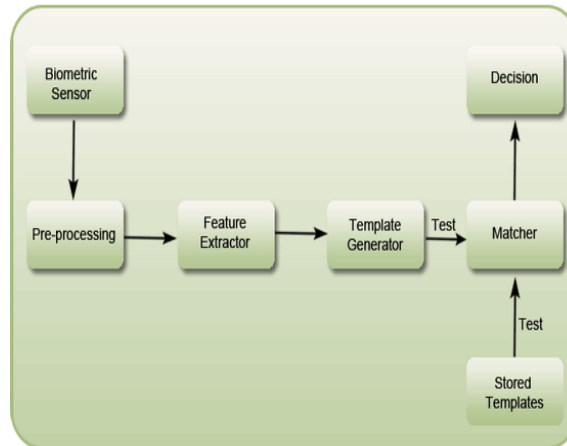


Fig.1. General Biometric System and its output process[5].

III. Biometric Parameters and Their Limitations

1. Fingerprint Recognition
2. Voice Recognition
3. Signature Recognition
4. DNA
5. Iris Scan

1. Fingerprint Recognition

The fingerprint is of the most widely used biometric recognition technique. It a method of verifying a match between fingerprints. Arch, loop and Whorls are the three basic ridge patterns of the fingerprint. Its application area includes

Hospitals, personal security etc. The surface area of finger consists of number of valleys and ridges [1].

Following are its advantages and limitations:

Advantage: Small storage space is required for template in the database and it is highly accurate [1].

Limitation: This system causes mistakes if the finger is not clean or due to the dryness of finger. It also causes error with the age [1].

Alternative: Prevention of false fingers can be done by implementing ‘liveness’ detection system. Fake fingers can be detected by using Perspiration patterns[11].



Fig.2.Fingerprint[7].

2. Voice Recognition

In voice recognition technique the speaker usually required to speak a secret code. Thus the voice of a particular person is measured and compared with the database.

Advantages: Verification time is less and more over it not much costly.

Limitation: Not very much accurate and a person's voice can easily be recorded and can be used for illegal activities and also the voice of a person can change due to illness.

Alternative: Multitask and learning by deep neural networks and related models to improve the efficiency of voice recognition system.



Fig.3. Voice Recognition [9].

3. Signature Recognition

Signature recognition is a type of behavioral biometrics. This type of recognition can be done both online (by writing signature in a tablet) and offline (by writing signature on paper).

Advantages: cheap and verification process is less.

Limitation: Possibility of error is more.

Alternative: Multimodal biometric system should be developed with an increasing level of skills.



Fig.4. Signature Recognition [8].

3. DNA:

DNA (deoxyribonucleic acid) is the exact form of biometric technique for identifying any user. DNA defines who we are psychologically and physically, hence it is impossible that some other person will have the same set of genes. DNA can be collected from nails, blood, finger, hair etc.

Advantages: The system never make mistakes, secondly this technique is highly accurate.

Limitations: Long term process and costly.

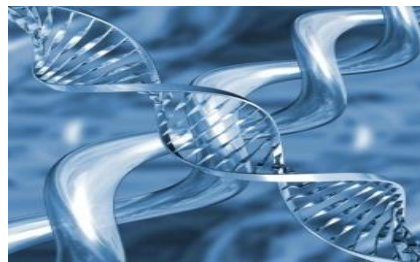


Fig.5. DNA recognition[17].

4. Iris Scan

Iris scan technique is based on video images of the irises of the eye. This recognition technique depends on the mathematical pattern-recognition technique. The image pattern thus obtained is very complex and unique.

Advantages: Highly accurate and generally verification time is less.

Limitations: Huge memory requirement and costly.

Alternative: Finland Researchers are developing biometric security system based on movement of eye of a particular individual as a more secure alternative to iris recognition [10].

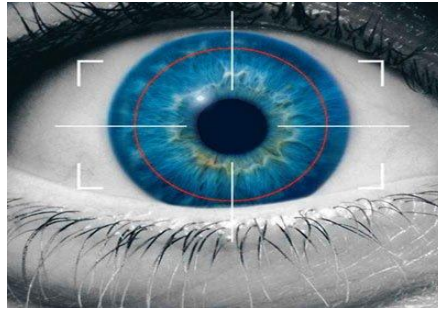


Fig.6. Eye Scanning[6].

IV. Conclusion

A biometric system is considered to be useful if it is unique, means the probability of any two users having the same characteristics will be minimum. The biometric application consists of positive and negative recognition. Positive recognition is traditional knowledge based and token based. Negative application mainly provides protection from terrorist attack in hospital, bus stops etc. Currently DNA is the most challenging recognition technique because it is highly unique and the chance of two users having the exact same DNA profile is extremely impossible, but this DNA recognition technique is still new and hardly used in public as it requires lot of expensive equipments. Due to this barriers and limitations, DNA is not nearly much used as iris, retina, face, fingers biometric recognition system. There is still some weakness in the biometric system .For ex: If a person losses his finger during any accident or injury the he becomes unable to use fingers biometric system for verification purpose. Similarly, for voice recognition illness or age can be a factor of failure for recognition [12]. To overcome these types of problem, DNA will be the best solution because it only requires a physical tangible sample as opposed to an image, impression or voice recorded. Therefore DNA provides a high level security, performance and accuracy than other recognition techniques.

Table II

Biometric Traits	Cost	False Accept Ratio	False Reject Ratio
Fingerprint	Med	2.2%	2.2%
Voice	Med	2-5%	5-10%
Iris	High	0.1%	1.1-1.4%
Signature	Low	1.08%	2.53%
Face	Med-low	0.1%	0.8-1.6%

b. Accuracy factors of biometric traits[13],[14],[15]

Here False Accept Ratio (FAR) describes the number of times, someone is inaccurately matched with the database. And False reject ratio derives the number of times someone is instead rejected [16].

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E-waste Management Techniques and India

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Abstract- The management of E-waste(MEW) is a crucial and important issue for all countries. The different measures are used to manage the “E-waste” by different countries. Different organizations are working to make proper planning’s for MEW. E-waste(EW) directly damaging the human health and environment because the few components are not properly get disposed off and while in use of their span of life they emit poisonous gases like CO₂. The Example of EW are – all gadgets which are running through the battery and electricity like PC’s, TV, Mobile, Machines, lamps etc. This paper will focus on MEW in India.

Keywords- *management of E-waste(MEW);India; Electronic waste; E-waste(EW); health; environment;*

1. INTRODUCTION

The electronic industry is one of the huge industry in the world. (Chaudhary, K., & Sharma, M. (2011); Reed, M. S. (2008). Of late, it has played a major role to the socio - economic and technological growth of a developing country. As a result, the environment is being challenged by the growing threat of “Electronics Waste” or “e waste” consisting of out-of-date electronic devices. It is an emerging problem of growing consequence, with ever increasing volumes of e-waste being generated. The fraction including iron, copper, aluminum, gold and other metals in e-waste is over 57%, while plastics account for about 40% and the hazardous pollutants comprise only about 2.70% (Nnorom, I. C., & Osibanjo, O. (2008)) Waste management, in India, is becoming more intricate by the invasion of e-waste. E-waste from developed countries is dumped into developing countries in the name of free trade (Lepawsky, J., & McNabb, C. (2010)) is elevating the e- management problems. The management of E-waste(MEW) is

crucial and important issue for all countries. The different measures are used to manage the “E-waste” by different countries. This paper highlights the management of E-waste (MEW) in India.

2. LITERATURE REVIEW

The quantity of e-waste generated and year wise disposal is not properly addressed in India because of lack of separate collection. Exchanging from retailers is the preferred practice among Indians on purchase of new items with old items. The business sector is estimated to account for 81% of all installed computers in India (Manomaivibool, P. (2009)). E-waste from the business sector are sold by auctions. Many times educational institutes or charitable institutions are donated old computers for reuse. It is estimated that the total number of obsolete personal computers emanating each year from business and individual households in India will be around 2.56 million. Confederation of Indian Industries reports, the total waste generation as good as 1,46,000 tons per year (Kahhat, R., Kim, J., Xu, M., Allenby, B., Williams, E., & Zhang, P. (2008)).

The life cycle of electronic product from 0.41 to 2.67 depending on the income class as per field survey in four metropolitan cities of India (Liu, X., Tanaka, M., & Matsui, Y. (2006)). Per-capita waste production in India is small, but in nearby future the total absolute volume of wastes generated will be huge. As per the questionnaire distributed during survey only 23% of the public are aware about the impacts of e-waste.

Increasing quantities of e-waste are reported to be imported every passing year (Joseph, K. (2007, October)). The government trade data fails to distinguish between imports of new and old electronic items and so it is difficult to track portion of imports is used electronic goods.

3. STUDY OF E-WASTE MANAGEMENT IN INDIA

No specific laws or guidelines for electronic waste has been defined (Nisa, M. (2014)). E-waste is not treated as hazardous in India unless proved to have higher concentration of certain substances. There are several grey areas that need to be addressed in the context of E-waste. The import of E-waste therefore requires specific permission of the Ministry of

Environment and Forests.

Informal and undefined sectors in the country are involved in the collection and re-cycling of electronic wastes. Certain action/steps have been initiated by Government to enhance awareness about management of electronic waste (Kahhat, R., Kim, J., Xu, M., Allenby, B., Williams, E., & Zhang, P. (2008)):

- Organization of workshop by the Central Pollution Control Board (CPCB) in collaboration with Toxics Link, CII etc.
- Rapid assessment of the E-Waste generated in major cities of the country.
- Strategy for E-Waste management by constitution of National Working Group.
- Publication and circulation of comprehensive technical guide on "Environmental Management for Information Technology Industry in India" by the Department of Information Technology (DIT), Ministry of Communication and Information Technology.
- Project demonstration to concerned group of the society.

However, there are certain challenges which need to be addressed specifically. These include

- The lack of reliable data that poses a challenge to policy makers while designing effective e waste management strategy.
- Nonexistence (Only 12%) of efficient take back scheme.
- Poor quality recycling scheme by informal and undefined sector.

4. MANAGEMENT OF E-WASTE (MEW)

Reducing the volume of e waste should be the prime concern. Re-use, renovation and/or upgradation of the product should be properly ensured. Less toxic, easily recoverable and recyclable materials should be better addressed. Refurbishment, remanufacturing, disassembly and reuse of such products should be taken care off. Recycling and reuse of material are the advance level options in reducing e-waste (Khan, S., & Faisal, M. N. (2008)). The magnitude of e-waste is reduced by recovery of metals, plastic and other materials. These will help in keeping toxic free environment and energy conservation. Figure below depicts proposed framework for E waste management. The proposed framework is need of the hour and measures must be taken to implement it quickly.

An e Waste Policy should be thoroughly understood. Industries should take initiatives

in implementing the policy by involving citizens. Sustainability of e-waste management systems has to be ensured by improving the effectiveness of collection and recycling systems (e.g., public-private-partnerships in setting up buy-back or drop-off centers) and by designing-in additional funding e.g., advance recycling fees. Improved collection effectiveness and recycling systems helps in sustainability of management of e waste(MEW).

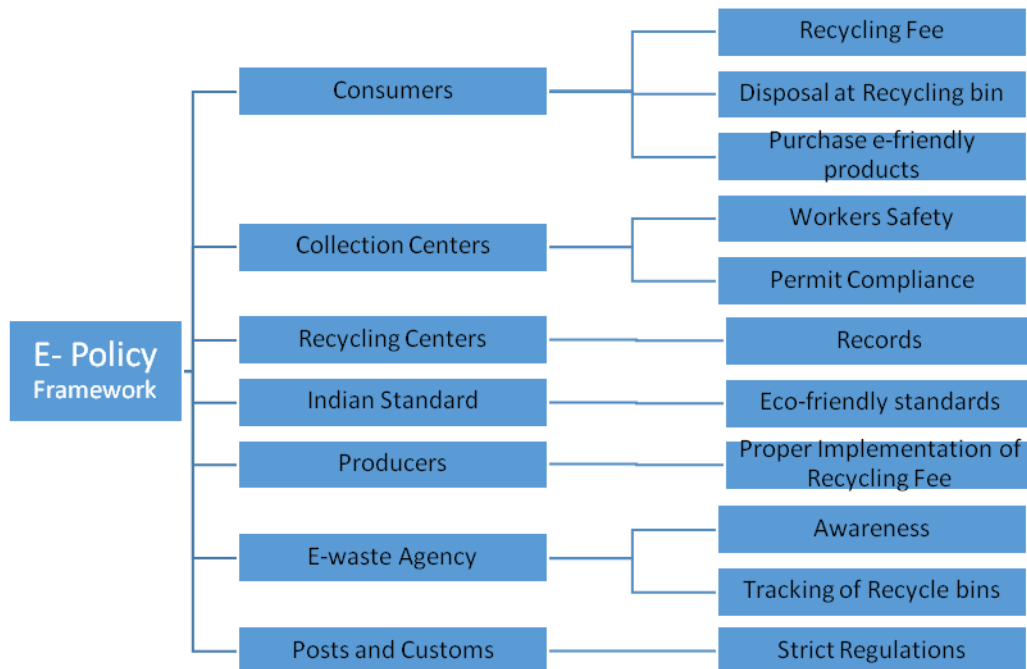


Figure Proposed Framework for Management of E waste (MEW)

5. DESCRIPTION OF THE PROPOSED FRAMEWORK

Management of electronic waste(MEW) proposed framework addresses major issues ranging from production and trade to final disposal, including technology transfers. Focus is specially made in clearing regulatory instruments, controlling both legal and illegal exports and imports of e-wastes and ensuring their environmentally viability. Loop holes should be addressed in ensuring e – wastes dumping from developed countries to India for disposal. The Port and the Custom authorities needed to be extra vigilant in monitoring these aspects. Product responsibility should be sole concern of Manufactures. Better management of restricted

substances should be implemented through following measures

- Defined return policy after use.
- Manufacturers financial responsibility
- Ergonomic design of new product
- Ban of hazardous materials and substances
- Meticulous scrutiny at borders
- Labelling environment friendly products.

All major cities of India must come under nation level inventory of electronic products. E waste agency should be formed with equal participation of public-private firms. This agency will provide the feedback to the Government. So that necessary action can be taken as per the need. Proper labelling of e – friendly electronic products should be motivated. Proper enforcement of regulations should be done. For effective compliance of regulations different types of penalties should be thoroughly implemented.

6. CONCLUSION

Management of e-waste is complicated task needed to be addressed at different parameters. Parameters including quantification, features, prevailing removal practices, environmental impacts of e waste etc. are needed to be sought out. National level initiatives should be implemented for better utilization of electronic products.

Consideration should be given in banning of materials from recycling programmes such as glass, plastic bags, and polystyrene. These may contribute to contamination problems, lower commodity prices or sometimes even market acceptability. Government need to continuously invest in recycling education. It is lifelong continuous investment. Separate waste collection should be made clearly distinguishing between recycled materials, trash cart and disposed.

Financial systems need to be developed to handle economic realities of India through establishing funds specially when recycling markets are down.

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An Analysis of Efficiency Measures of Parallel Sorting Methodologies

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Abstract: Sorting is a high performance activity in the field of parallel computing which is commonly used in a large list of applications. Previous researches in parallel processing have provided the theory and analysis of parallel sorting methodologies and algorithms. Modern super-computers are advance, rapid and their architecture can be changed easily and significantly. In this paper, a study of performances of different sorting algorithms along with scenarios under read/write conflicts in EREW, CREW and CRCW sorts is given. In these approaches processors access the same shared memory location simultaneously. Similarly other sorting algorithms like bubble sort, selection sort, quick sort and merge sort work with their own way and hence they have their efficiency measures also. This study presents an efficiency analysis of different sorting algorithms so that a better algorithm can be designed to overcome existing privations.

Keywords: EREW, CREW, CRCW, sorting, parallel computing.

1. Introduction

Parallel computing is a well distinguished field in modern computation. Parallel computing involves multiple processors/systems connected together. When a process is to be performed by, it is broken in to different sub processes and each of which is assigned to different processors and executed simultaneously [1]. To do that, a centralized control/coordination mechanism is employed.

Sorting is an important kernel for sequential and multiprocessing computing and a foundation part of database systems also. Sorting is a fundamental operation that is performed by most computers. It is a computational building block of basic importance and is one of the most

widely studied sorting problems. Sorted data are much easier process and manipulate than randomly ordered data [2].

2. Sorting Methodologies

Real world computational problems need ordering of elements while being processed in parallel. These kinds of problems are solved by a method, called sorting. In this section, processes of some widely adopted parallel sorting algorithms are discussed along with their efficiencies.

2.1 Parallel bubble sort

Parallel sort technique may use *odd-even transformation* which has two phases named *odd phase* and *even phase*. In *odd phase* values situated at odd numbered processors are compared with right neighbor and swapped if needed. Similarly in *even phase* values situated at even numbered processors are compared with right neighbor and interchanged if required. This requires utmost $n/2$ iterations [3].

In order to implement parallel bubble sort *odd-even transformation can be used* in which both of the phases are put inside a main loop which uses a boolean flag to declare the completion of sorting process [3].

Say there is p number of processors available and n elements are to be sorted, then each iteration will perform $n-1$ comparisons. If total number of processors are less than $n/2$ then each processor needs to perform $(n/2)/p$ comparisons. Hence the complexity in this scenario will be $O(n^2/2p)$. If number of processors is more than $(n/2)$ then complexity of this algorithm will be $O(n)$ [3] which is much better than sequential bubble sort with complexity – $O(n^2)$.

2.2 Parallel Selection sort

There are different variations of parallel selection sort are in knowledge researched and implemented. One of the best implementations is Min-Max Bidirectional Parallel Sort. The idea at the rear is to distribute the elements to existing processors and divide this set of processors in

to two equal parts logically. One minimum and one maximum values are found from each part. Both minimum values are compared and both maximum values are compared and if it is found that they are not in their correct position i.e. the minimum value should be kept at very first place and largest value should be kept at final most place of overall set of processors [4].

After each pass one smallest and one largest values are shifted to their correct place and hence each pass reduces the sort space by 2 [4]. This technique exhibits extended efficiency, thus takes around $O(n \log n)$ time to sort overall values which is much better than sequential selection sort which has quadratic order of growth.

2.3 Parallel Quick sort

Parallel version of quick sort also works by dividing the list of elements. It works on hypercube architecture of processors with dimension D so number of processing elements can be maximum 2^D . Initially elements are distributed to different processors and then one processor is assumed to be the pivot. Pivot broadcasts its element to rest of the processors. After broadcast interchange of elements takes place and processors having smaller values than pivot are labeled as 0 and processors having greater values than pivot are striking as 1. Based on the smaller elements than pivot and larger elements than pivot the whole list of elements is divided in two parts, one of them holds smaller values and other holds greater values than pivot. These sub-lists are contained in sub-hypercubes and again this procedure of division is performed on both the sub-hypercubes by taking pivot in both sub-lists and this process continues until all the elements are sorted [2].

Thus this method exhibits the running time [2]:

$$T(n, p) = O \left(\left(2(n+1) \left(1 - \frac{1}{p} \right) - \log p \right) + \left(\frac{n \log n - ((n+1) \log p - 2(p-1))}{p} \right) \right)$$

which gives good efficiency.

2.4 Parallel Merge sort [5]

Unlike sequential merge sort parallel merge sort and parallel merge work in distinguished way. Suppose the size of input array is N , and P is the number of threads (processors). During the 1st stage, each processor independently sorts an interval of size N/P using a sequential sort. The 2nd stage merges all sorted intervals into the output array using the partition. The 1st thread takes N/P smallest elements from all sorted intervals and merges them into the interval $[0 \dots N/P)$ in the output array; the 2nd thread takes the next N/P smallest elements from all sorted intervals and merges them into the interval $[N/P \dots 2(N/P))$ in the output array, and so forth. Each thread can easily pick up the smallest elements independently of any other thread. Suppose that a thread picked up n_1 elements from the first interval, n_2 elements from the second interval and so on. The merge procedure combines sorted sub-sequences of size n_1, n_2, \dots, n_P into the single ordered sequence of size $\sum n_i$ using a tree. The optimal implementation makes a single traverse over tree for each element [5]. Hence this process leads to the level of efficiency of $O((n \log n)/p)$ which gives much better efficiency than sequential merge sort.

2.5 CRCW sort

Assume that n^2 processors are available on such a CRCW computer to sort the sequence $S = \{s_1, s_2, \dots, s_n\}$. The sorting algorithm to be used is based on the idea of sorting by enumeration: The position of each element s_i of S in the sorted sequence is determined by computing c_i , the number of elements smaller than it. If two elements s_i and s_j are equal, then s_i is taken to be the larger of the two if $i > j$; otherwise s_j is the larger. Once all the c_i have been computed, s_i is placed in position $1 + c_i$ of the sorted sequence. To help visualize the algorithm, we assume that the processors are arranged into n rows of n elements each and are numbered. The shared memory contains two arrays: The input sequence is stored in array S , while the counts c_i are stored in array C . The sorted sequence is returned in array S . The i th row of processors is "in charge" of element s_i : Processors $P(i, 1), P(i, 2), \dots, P(i, n)$ compute c_i and store s_i in position $1 + c_i$ of S [6].

This algorithm is having great impact over resolution of read/write conflicts and it exhibits the efficiency of $O(n^2)$ [6].

2.6 CREW sort

CREW merge serves as a basis for the CREW sorting algorithm. The idea is quite simple. Assume that a CREW SM SIMD computer with N processors P_1, P_2, \dots, P_N is to be used to sort the sequence $S = \{s_1, s_2, \dots, s_n\}$, where $N < n$. We begin by distributing the elements of S evenly among the N processors. Each processor sorts its allocated subsequence sequentially using parallel quick sort. The N sorted subsequences are now merged pairwise, simultaneously, using CREW merge for each pair. The resulting subsequences are again merged pairwise and the process continues until one sorted sequence of length n is obtained. The algorithm is called in what follows as procedure CREW SORT. In it we denote the initial subsequence of S allocated to processor P_i by S_i . Subsequently, S_j is used to denote a subsequence obtained by merging two subsequences and P_j the set of processors that performed the merge. This method exhibits the efficiency of $O((n/N) \log n + \log^2 n)$ [6].

2.7 EREW sort

Two of the criticisms expressed with regards to procedure CRCW sort were addressed by procedure CREW sort, which adapts to the number of existing processors and disallows multiple-write operations into the same memory location. Still, procedure CREW sort tolerates multiple-read operations. The simplest way to remove read conflicts from procedure CREW sort is to use procedure multiple broadcast. Each attempt to read from memory now takes $O(\log N)$ time. Simulating procedure CREW sort on the EREW model therefore requires the time: $O((n/N) + \log N) \log n \log N$ [6].

Conclusion

As discussed in this research , different sorting algorithm work in that own way in parallel system. The efficiency of any sorting algorithm depends on the procedure adopted as well as depends on the time taken to divide a problem into sub problems and merging the sub solution to form actual solution.

If certain techniques can be discovered to reduce the time taken in breaking down a problems, to merge the sub solutions and the method of sorting. Then even the best time can also be reduced to smallest amount of time.

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Future of E-Commerce in India

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Abstract: The E-Commerce is a concept of E-Business that allows to sales and purchase using internet or through any type of network..That is the mechanism of sales product via internet. This paper is aimed to investigate e- business requirement and lookup best way reduce the human effort. That paper is provide an overview of the future of E-commerce in India and discusses the future growth of E-Commerce. And find factors for future growth of e-commerce in whole Asia. And also search the opportunities for retailers, wholesalers, producer and end -user.

1. Introduction

E-Commerce (Electronic commerce) is known as electronic business. That is digital market. That is refers to sales and purchase products using computer network such as internet. And use of electronic medium to carry out commercial transactions. Every merchant has their own website and application for trading the product and conduct of transactions. Overall that is a trading of products and services through internet. A client who purchases on the Internet is called a **cyber customer**. That is not only limited to online sales and purchase, but also covers:

- Online estimates preparation.
- User consultant.
- Provision of digital models.
- Plan access to sales point.
- Stock and real time management for product.
- Online payment
- Tracking delivery.

2. CONCEPT

My experience shopping online and working on a major online commerce site — Borders.com — has shown me that most people involved in the design, creation, marketing, implementation, hyping and analysis of ecommerce sites haven't thought about the basic relationship that commerce is based on. A quality online shopping experience must be designed from a firm understanding of this basic relationship.

Essays in this ecommerce series:

- Introduction and Overview
- Online vs. "Traditional" Commerce
- Schemas & Concept Mapping
- The Roles within Commerce
- Branding & Merchant Identity
- Messages For The Users
- Trust & Trustworthiness

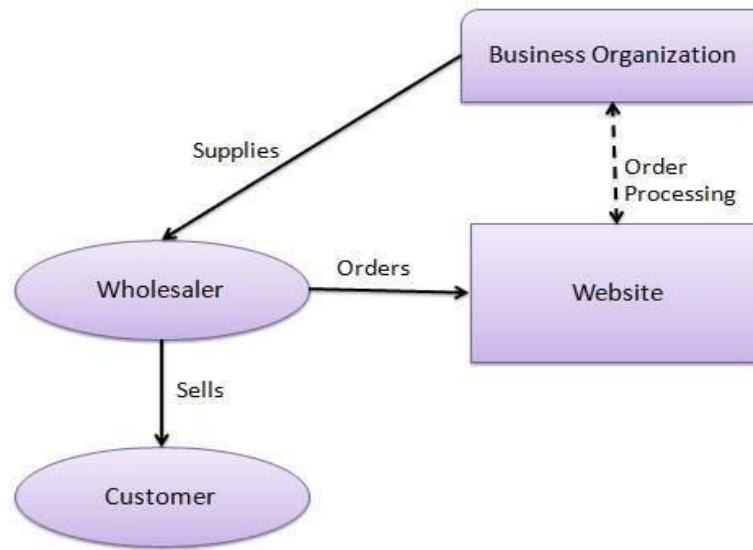
A more complete definition is: E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals.

3. DIFFERENT TYPE OF E- COMMERCE:

3.1 The major different types of e-commerce:

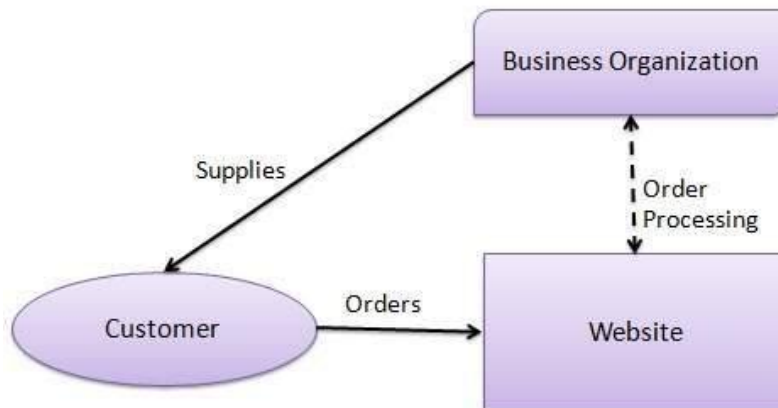
- **Business-to-business (B2B).**

Website following B2B business model sells its product to an intermediate buyer who then sells the product to the final customer.



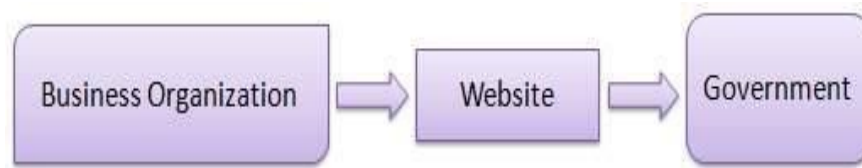
➤ **Business to- consumer (B2C).**

Website following B2C business model sells its product directly to a customer. A customer can view products shown on the website of business organization.



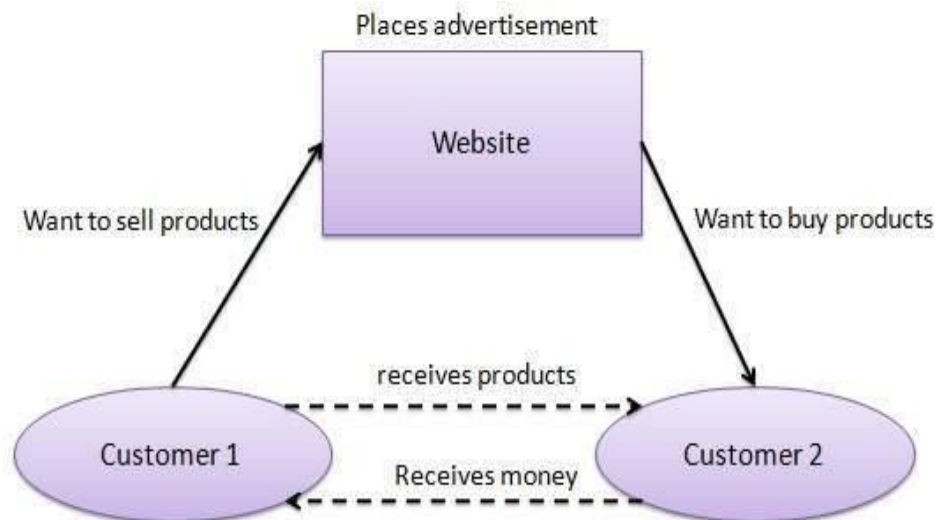
➤ **Business-to-government (B2G).**

Government uses B2G model website to approach business organizations. Such websites support auctions, tenders and application submission functionalities.



➤ **Consumer-to-consumer (C2C).**

Website following C2C business model helps consumer to sell their assets like residential property, cars, motorcycles etc. or rent a room by publishing their information on the website.



3.2 payments:

E-Commerce or Electronics Commerce sites use electronic payment where electronic payment refers to paperless monetary transactions. Electronic payment has revolutionized the business processing by reducing paper work, transaction costs, labor cost. Being user friendly and less time consuming than manual processing, helps business organization to expand its market reach / expansion. Some of the modes of electronic payments are following.

- Credit Card
- Debit Card
- Smart Card

- E-Money
- Electronic Fund Transfer (EFT)

3.3 E-commerce in India

For developing countries like India, e-commerce offers considerable opportunity. Ecommerce in India is still in growing stage, but even the most-pessimistic projections indicate a boom. It is believed that low cost of personal computers, a growing installed base for Internet use, and an increasingly competitive Internet Service Provider (ISP) market will help fuel e-commerce growth in Asia's second most populous nation. The first e-commerce site in India was rediff.com. It was one of the most trafficked portals for both Indian and nonresidents Indians. It provided a wealth of Indian-related business news a reach engine, ecommerce and web solution services. The past 2 years have seen a rise in the number of companies enabling e-commerce technologies and the internet in India. Major Indian portal sites have also shifted towards e-commerce instead of depending on advertising revenues. The web communities built around these portal sites with content have been effectively targeted to sell everything of the major players have been deterred by the low PC penetration and credit card.

3.4 Future of e-commerce in India

The simulation of arise profit ad widely use of internet access equates to powerful future for e-commerce across the world. India is developing rapidly and if development is to be measured, we cannot ignore the performance and role of e business and e-commerce in it. The based on internet user in India more than 100 million which is very short when compared to its presentation in the United State or United Kingdom. But that is sure expanding at a dangerous range. Various kinds of new entrants in this realm is escalating continuously and with develop rate reaching its extremity it can be presumed that in years to come, consumers and retailers will feel the need to switch to online business. Insights into increase demand for internet services, rising standards of living, availability of wider product ranges, reduced prices and busy lifestyles reveal this fact more prominently thereby giving way to online deals on gift vouchers. Going by the statistics, the E commerce market in India was worth about \$2.6 billion in 2009. It rose to

\$8.6 billion by 2011 thus depicting a definite surge in the last two years. According to a statement released by the Internet and Mobile Association of India, these figures would reach up to \$13 billion by 2012! To understand this though, we can categorize E-commerce into some broad categories that are services, physical and virtual goods.

The combination of rising disposable incomes and increased internet access equates to strong growth potential for e-commerce across the developing world. The explosion of this sales channel has enabled retailers to reach customers across geographies and markets in a variety of ways, thereby changing the experience for both the seller and buyers. In a recent report, Credit Suisse said it expected e-commerce as a share of total retail sales to become bigger in nine key emerging markets than in developed economies. These markets are Indonesia, India, Turkey, China, South Africa, Saudi Arabia, Mexico, Brazil, and Russia. Indeed, e-commerce growth across Africa and Southeast Asia is expected to outpace that in the developed world over the next ten years. While these are exciting headlines, there are significant challenges to overcome, ranging from poor connectivity and logistics bottlenecks to regulatory hurdles. Understanding some of the trends underpinning e-commerce expansion in developing markets is crucial, and many of these are driven by politics. Published in collaboration with Eurasia Group in July 2015, a PwC point of view article titled Politics and e-commerce in emerging markets: Three things to watch discusses three ways in which politics will affect e-commerce in emerging markets. Increasing by 18 per cent in the past year. E-commerce can become an integral part of sales strategy while it is one of the cheapest medium to reach out the new markets, if implemented successfully, it offers a smart way of expansion & doing e-commerce attribute to the successful implementation to carefully understanding the products & services, customers and the business process, easy -to-use system to extend the business on the web. A new report by the Boston Consulting Group says online retail in India could be a \$84- billion industry by 2016 — more than 10 times its worth in 2010 — and will account for 4.5 per cent of total retail. The e-commerce platforms maximize its reach to the potential customers and provide them with a convenient, satisfying & secure shopping experience.

Segments that recorded growth Online channels are playing an important role of connecting with consumers of unexplored markets. The journey of online spending that started with an increasing number of buyers of travel and holiday plans in the last decade has now extended to an increase in spends on household appliances and luxury products. While segments like apparel and luxury products have registered unprecedented growth in 2011, jeweler, electronic appliances and hardware products have shown promising growth trends as well. “Indian consumers are showing greater appetite to transact online, fuelling the e-commerce boom,” said Anuj Kumar, CEO, and Baffle. The report also found that coupon sites are rapidly gaining popularity, with 16.5 per cent of the Indian online population visiting the category in November 2011 – 27.2 million online users in India aged 15 and older accessed the retail category from a home or work computer, an increase of 18 per cent from the previous year, as consumers continue to turn to the web to shop for and purchase items and retailers continue to increase their online visibility through active marketing campaigns. Increase in shoppers of the coupon sites indicate that pricing is playing the role of catalyst in bringing more and more shoppers online. Many of these shoppers have shown affinity towards affordable online goods, which was priced lesser than the market price. Some of the largest retail subcategories revealed that coupons category was the largest with 7.6 million visitors as consumers rapidly adopt daily deal sites. Consumer electronics ranked next with 7.1 million visitors, growing at 12 per cent over the previous year, while 5.8 million online users visited comparison shopping sites, an increase of 25 per cent from the previous year.

4. INDIA’S PROSPECTS IN E- COMMERCE:

4.1 Opportunity for retailers:

A retailer can save his existence by linking his business with the on-line distribution. By doing so, they can make available much additional information about various things to the consumers, meet electronic orders and be in touch with the consumers all the time. Therefore, E-Commerce is a good opportunity.

4.2 Opportunity for whole sellers/distributer:

In the world of Ecommerce the existence of the wholesalers is at the greatest risk because the producer can easily ignore them and sell their goods to the retailers and the consumers. In such a

situation those wholesalers can take advantage of E-Commerce who are capable of establishing contractors with reputed producers and linking their business with the on-line.

4.3 Opportunity for producers:

Producers can take advantages of e-commerce by linking themselves with on-line, by giving better information about their products to the other links in the business chain and by having a brand identity.

4.4 Opportunity for people:

As more people are getting linked with E-commerce, the demand for centre providing internet facility or cyber cafe is also increasing. Hence, the people who wish to take advantage of it can establish cyber and have their benefits.

Essential factors for growth of E-Commerce in India:

Customer convenience: By providing Cash on delivery payment option service to customers.

Replacement guarantee: Should be Offers 30 day replacement guarantee to their customer's

.Reach: Enabling mobile-capable sites and supporting M-Commerce services .Location based

services: Since customers these days are always on the move, promoting the right product at the right time and location becomes an integral aspect.

Multiple payment option: standard credit cards, debit cards and bank payments option should be there.

Right content: Getting the right content and targeting customers with crisp and relevant information is of utmost importance to users on the move.

Price comparison: Providers offering instant price comparison are highly popular amongst the price conscious customers.

Shipment option: Low cost shipment should be there. The convenience of collecting orders post work while returning home should be there.

Logistical challenges: In India, the geographical spread throws logistical challenges. The kind of products being offered by providers should determine the logistics planning.

Legal challenges: There should be legal requirement of generating invoices for online transactions.

Quick Service: Timely service provided by the company.

Terms and condition: T & C should be clear & realistic.

Quality: The product quality should be same as shown on the portal.

Customer care centre: A dedicated 24/7 customer care centre should be there.

5. EXPERTS VIEW ABOUT FUTURE GROWTH OF E-COMMERCE IN INDIA:

Leading e-commerce portals in the country include Flipkart.com, Futurebazaar.com, Ebay.in, Homeshop18.com, Snapdeal.com, Indiaplaza.com, Starcj.com, Amazon.com, Fashionandyou.com, Rediffshopping.com., inkfruit.com, myntra.com, futurebazaar.com, yebhi.com, zoomin.com and hushbabies.com. Internet on mobile phones and e-commerce are set to lead the trend in the IT sector, Google India MD Rajan Anandan said on June 2012. Speaking at the 13th annual Confluence at the Indian Institute of Management, Ahmadabad (IIM-A) here, Anandan identified trends such as mobile internet, social networking, ecommerce and internet video as being the most important trends for any technology company to

take advantage of. "We have seen 80-90 per cent growth in traffic month-on-month over the last three quarters. We have been gradually increasing the pace of hiring and over the next six months, we will add about 500 people," Snapdeal Chief Executive Director Kunal Behl said. "With the growing e-commerce industry in the country and major international players entering the market, the number of job offers would certainly look up," e-commerce firm Homeshop18.com CEO and founder Sundeep Malhotra said.

The online retail segment is expected to report strong growth in the coming years owing to growing Internet consumer base thanks to increasing use of smartphones, laptops/PCs and availability of Internet in the remotest part of the country. "e-commerce space is a booming space as Internet audience are likely to double in the next two-three years and this industry will

require talent from various sectors like technology, product, analytics, sourcing, general management talent, merchandising and marketing," online retailer Fashionandyou.com co-founder and CEO Pearl Uppal said. Another e-commerce player HomeShop18.com has grown by over 70 per cent in headcount terms in 2011 over the last year and is further poised to grow by a similar percentage this year, including an augmentation of the technology team. Meanwhile, the e-commerce sector is fast hiring the best talent available in the country and this placement season saw e-commerce companies recruiting big numbers at premier institutions like the Indian Institutes of Management (IIMs) and Indian Institute of Technology (IITs). According to a report by industry body Assoc ham, online retail segment is likely to be worth Rs 7,000 crore by 2015 due to rising broadband availability and increasing Internet penetration, from the Rs 2,000 crore at present. It is growing at an annual rate of 35 per cent.

6. CONCLUSION

The future of E-Commerce is difficult to predict. There are various segments that would grow in the future like: Travel and Tourism, electronic appliances, hardware products and apparel. There are also some essential factors which will significantly contribute to the boom of the E-Commerce industry in India i.e. replacement guarantee, M-Commerce services, location based services, multiple payment option, right content, shipment option, legal requirement of generating invoices for online transactions, quick Service, T & C should be clear & realistic, the product quality should be same as shown on the portal, dedicated 24/7 customer care centre should be there. We found various types of opportunities for retailers, wholesalers/distributors, producers and also for people. Retailers meet electronic orders and should be in touch with the consumers all the time. Wholesalers can take advantage of Ecommerce who are capable of establishing contractors with reputed producers and linking their business with the on- line. Producers can also linking themselves with on-line, by giving better information about their products to the other links in the business chain and by a having a brand identity. As more people are getting linked with E-commerce, the demand for centre providing internet facility or cyber cafe is also increasing. Hence, the people who wish to take advantage of it can establish cyber and have their benefits. People could found various opportunities of employment.

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Geo-informatics: for Mapping

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Abstract— This study examines the various ways by which the maps are created, based on the surveys and data collection. Different methods of collection of data regarding earth and its physical attributes are briefed. This study is taken to put together all the collected data into a single map. The data related to crust and mantle layer of earth along with its boundaries depending upon the depositions of minerals and type of rocks found; the waypoints and tracks can be marked and be traced using GPS and GSP. Having all these details will assist in decision making about the mining, farming and residential purposes. The area can be marked digitally and be kept records of the leased lands along with their lessee along with the details description of the area. Software is suggested that will be able to configure all the data that are mostly in picture format and some in digits to go along for the purpose.

Index Terms—Mineral, Maps, Soil, Rock, GIS, GPS, GSP

1. INTRODUCTION

OVER time we have been finding and mining minerals from the earth. We have been able to detect the kind of rocks in mantle by the kind of soil in the crust layer of earth. These observations are performed manually; by visiting the sites, taking samples and testing them. With the help of geo-informatics observations can be made in much easier manner, from a distant place. It is possible to identify the soil type from the satellite using which maps can be made to know the kind of mineral to be found. These images are stored in the database and processed to be map. GIS (Geographical Information System) and GPS (Global Positioning System) have made significant changes in the survey of earth. Geo-informatics gives us the ability to encompass a variety of temporal and spatial scales, integrate heterogeneous data, and visualize data and analytical results.

Geo-informatics is an informatics framework for the discovery of new knowledge through integration and analysis of earth-science data and applications. Fostered by support from both national and international agencies, geo-informatics has emerged to address the growing recognition that problems with significant societal implications require integrative and innovative approaches for analysis, modeling, managing, and archiving of extensive and diverse data sets.^[1]

Map showing the distribution of minerals in a region viz, maps describing the location or the conditions of the formation of the mineral deposits. These maps are prepared on the basis of the records of mineral deposits and data obtained from the geological surveying's, prospecting and exploration. 'The compilation of these maps often requires special metallo-genetic, geochemical, hydrochemical, lithological and paleogeographical research, as well as study of conditions of coal accumulation and of the presence of petroleum and gas.'^[2]

Motivation of the study

This study was motivated by the need to figure out a solution for mapping the minerals in a map, so that the pathway to reach that particular position to mine is possible. Mineral mapping helps to mark the places that will not be suited for residential purposes; they are the places that will be mined. Maps are used to mark the areas that are leased to people for mining.

Research methodology

Satellite Imagery and aerial photography have proven to be important tools in support of mineral exploration projects. They provide geologists and field crews the location of tracks, roads, fences and inhabited areas. This is important for mapping out potential access corridors for exploration areas and considering the environmental impact of large project. These images are also useful for mapping outcrops and regolith systematic and vegetation across exploration blocks and over regional areas.

Objective of the study

The Geological Survey of India uses some software like ArcGis for creation of maps and Surfer for mapping. To process the satellite images Photo Geology Remote Survey (PRGS) is performed. Even after having these technologies and software geologists are needed to visit the

site for mapping the area of the mineral depository, this process is called Toposite mapping of rocks. The maps are created by testing the soil, the color and texture of soil confirms the kind of rock lies within. Then, the type of land is checked; if it is plateau, plain or mountains. Maps are made considering these both factors. There after the roads are mapped. Nearby cities or residential areas are found and a pathway is decided. Context marking is also a part of toposite mapping.

This is a process of marking boundaries. Boundaries of the mineral deposits, a boundary in map is created to detach the area of deposit of different minerals and rocks. All this work is performed manually by the geologists. The maps are later created in the digital form. The objective of this study is to perform these jobs in a digital manner.

It is possible to discriminate soil types using satellite imagery. The soil classification from satellite remote sensing data is possible, but the accuracy of estimation depends on satellite's sensor, and in particular it is affected by spatial and spectral characteristics of sensor. For context mapping GPS is used. It helps to locate the mine as well as the miners. Brunton Atlas GPS Software is used for satellite mapping of waypoints, routes and tracks. The theodolite survey is the process of surveying horizontal and vertical angles.

Proposed method

The present methods that are being used for mineral mapping are basically performed by the geologists and their subordinates. This process can be performed by a satellite vision of the area. Satellite imagery is possible and they provide a distinctive image of the area. This image is known as ASTER image. These images can be more developed and accurate as for mapping. Satellite images can also benefit geologists, scientists, and exploration managers due to the multiple bands that the satellites carry which allow them to interpret wavelengths that cannot be seen by the human eye. Near infrared, short wave infrared, and thermal infrared can be used to identify the difference in structural features of the earth's surface. Multispectral imaging and thematic mapping allows researchers to collect reflection data and absorption properties of soils, rock, and vegetation. This data could be utilized by

trained photogeologists to interpret surface lithologies, identify clays, oxides, and soil types from satellite imagery. Having these technologies they can be added to make one map that will be able to project data about the area as:

- Type of soil and rocks
- Type of mineral found
- Type of vegetation
- Connecting routes
- Area covered and Boundaries
- Leased area

A software that is able to mark all these variables in a single map using different colors, boundaries and waypoints. The pictures that are received from the satellite can be edited and made into a full fledged map that contains all the above details. The different maps that depict various insights of the earth area will be combined into one by adding all their data and figures. This will lead to a single map with complete detail of a particular area (or even a broad one) which can be referred for all queries.

Scope and Limitations of the proposed work

This work has a wide and variant scope. The maps can be used for various uses not just for mining area mapping. They may be used to know the usefulness of the area, its accordance in vegetation and residential purpose. Knowing the kind of rocks helps to know the flora and fauna suitability of the region. Its dependency of natural calamities can be known beforehand.

The limitation of the proposed work is that the software that fulfils the need of the work will take a lot of expert people in different field of work. Geologists, software developers, satellite scientists and hardware machine designers will be needed to accomplish it. It will need quite a finance and ample of time to be projected practically.

Geo-informatics is still a subject of research. No accurate proportions have been introduced related to the method of use of it. Quite a lot of expertise and monitory and technical support is

still welcome in this field. It requires an enormous amount of data inputs to be practical for some tasks to be performed. The earth is round and geographic error is increased as you get into a larger scale.

Data collection for the mapping

In remote sensing, the data about an object is acquired by sensor; a device which detects radiation received from the object and transforms the same into recordable information. The sensor is mounted on a suitable platform. These components constitute the data acquisition system and will be dealt in more details below. There is no single sensor which can detect the signals from the entire range of EM spectrum. Each sensor can only gather information from a certain band of the spectrum. At the outset, two broad categories of sensors can be identified as non-imaging and imaging. Normal aerial cameras can take pictures in B and W, color, B and W infrared or false color, by using suitable films. In this system, the sensing is done in visible and optical IR parts of the EM spectrum, by a single sensing unit and the data recorded is cumulative information from the entire band. However, if data in different sub-regions of this band can be obtained separately for comparative study, more useful information can be extracted. This is achieved in Multispectral photography and Multispectral scanning.

Graphical views



Fig. 1- ASTER image (15 m), Morenci Mine Mineral Mapping - Arizona, USA

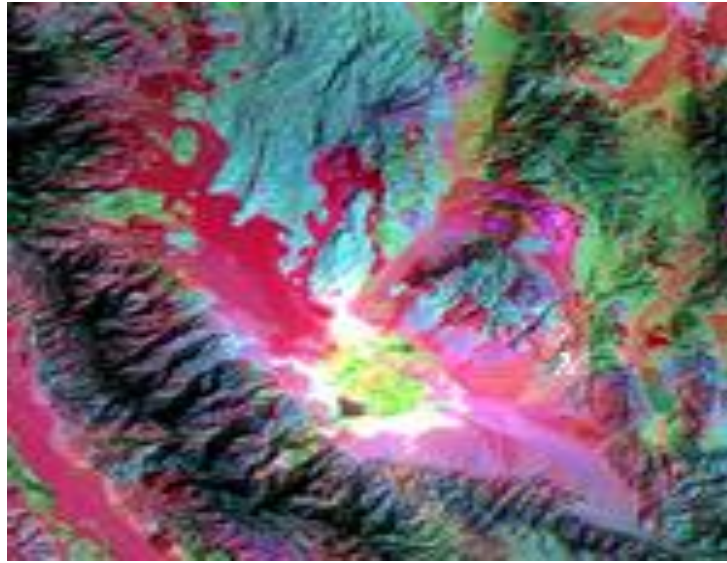


Fig. 2: ASTER images (15m), Mine in Saline, California

The images display visible and near infrared bands 3, 2, and 1 in red, green, and blue (RGB). Vegetation appears red, snow and dry salt lakes are white, and exposed rocks are brown, gray, yellow and blue. Rock colors may reflect the presence of iron minerals, and variations in albedo. The middle image displays short wavelength infrared bands 4, 6, and 8 as RGB. In this wavelength region, clay, carbonate, and sulfate minerals have diagnostic absorption features, resulting in distinct colors on the image. For example, limestones are yellow-green, and purple areas are kaolinite-rich. The right image displays thermal infrared bands 13, 12 and 10 as RGB. In this wavelength region, variations in quartz content appear as more or less red; carbonate rocks are green, and mafic volcanic rocks are purple. ^[3]

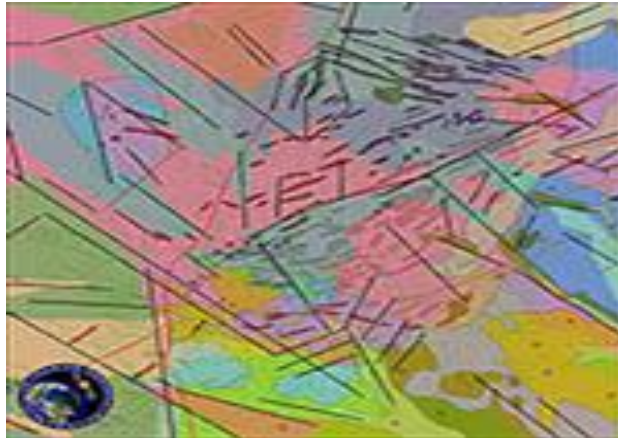


Fig. 3: - Geological Interpretation using ASTER, DEM and 8-B and MS WorldView-2 Imagery

Conclusion

Therefore, the use of geoinformatics for mineral mapping is a possible by using the technologies of information technology and computer science and combining it with the techniques of geology. It will lead to software that is able to test the soil and know the kind of rock within. Mark the boundaries of deposition that particular rock and also find connection and waypoints to the neighborhood. Technologies as GIS and GPS are used to perform these tasks.

Imaging spectroscopy of bare soils has been known to have considerable potential for the estimation of properties such as soil texture. The software today is sound enough for taking images of soils and to know its compositions. This can be further enhanced to more advanced mapping software.

Future Scope

Geological data and information are required to find effective scientific solutions to the challenges that society faces today. Furthermore it can be used for disaster management, land lease, residential permissions, farming suggestions depending upon the kind of soil, finding water resources, vegetation of flora and so on..

Many fields benefit from geo-informatics, including urban planning and land use management, in-car navigation systems, virtual globes, public health, local and national gazetteer management, environmental modeling and analysis, military, transport network planning and management,

agriculture, meteorology and climate change, oceanography and coupled ocean and atmosphere modeling, business location planning, architecture and archeological reconstruction, telecommunications, criminology and crime simulation, aviation, biodiversity conservation and maritime transport.

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IOT devices and GREEN Computing Methodologies

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Abstract:

In today's scenario, many objects intercommunicate to transmit data for communication, observation and/or analysis purpose. The increase in number of intelligent devices has widely increased energy consumption and revolutionized employment of resources. This has resulted in hazardous effects on the environment. An energy efficient system is needed that helps optimizing energy consumption for heating, lighting, security, air conditioning, ventilation, etc. which ensures that energy is consumed efficiently and effectively. Also, environment friendly employment of resources needs to be promoted so as to save the environment from the hazardous side effects of this rapid increase in consumption of resources. This paper aims at describing various existing methods that have been implemented for blending green computing with IoT.

Keywords: Green Computing, IoT, Energy efficiency, Environment sustainability, WSN, RFID, M2M, CC, DC, ICT, Green.

1. INTRODUCTION:

1.1 Green Computing:

The increase in use of technologies and emergence of numerous devices and led to an enormous increase in engaging a huge number of resources. A sense of awareness and motivation for responsibly using resources for manufacturing, usage, disposal and recycling of computer and other electronic devices, led to the idea of Green Computing. It is a technology of effectively and efficiently using computer systems and its resources-printers, monitors, CPUs, network-peripherals, communication-devices, etc. Not only does the Green Computing concern with optimum utilization of resources, it also greatly emphasizes on minimal usage of hazardous

resources (due to their detrimental short-term as well as long-term effects), efficiently manage energy usage during the lifetime of product and promotion of recycling measures for managing wastes from products and factories.[1] Green computing aims at attaining economic feasibility and improving the implementation of computational devices. Following environmental-friendly sustainable production policies, energy efficient devices and improving disposal and recycle procedures are few of the practices involved in working towards green computing.

1.2 Internet of Things (IoT):

The Internet-of-Things, widely known as IoT, is simply an ambience where people, animals and objects, marked with unique identification, possess the ability to transmit information over a network, without requiring interaction of human with another human or a machine. Wireless technologies, Micro-Electromechanical System (MEMS) and Internet blend to form the IoT environment. A Thing in IoT can be any of the following: A human having heart monitor implanted, a farm animal with implanted biochip, a vehicle sensing low-pressure in type and instantly alerting the driver, field –operation devices for searching and rescue purposes or any other natural or artificial object, that can be assigned IP and possess ability to transmit data over a network.[2] The massive interconnection of Things, allows dynamic generation, analysis and communication of intelligence data, increasing operational efficiencies, and empowering new and improved business working models.[3] Hence, IoT is embedding electronics, software, sensors and network connectives with objects, devices, buildings, automobiles, thus enabling collection and exchange of data. The most important component of IoT ambience is the sensors. They are to IoT what sensory organs are to human body. These sensors can registers changes in temperature, pressure, light, motion and sound. These sensors are subset of category of devices, called MEMS (Microelectromechanical System). These sensors are manufactured in a similar way as microprocessor. They appeared with integrated circuits, each circuit possessing a limited amount of programming capability and are hardwired to perform some task(s) upon happening of something.

1.3 Energy Consumption Issues In IoT:

The IoT is a new IT paradigm for the current decade. It ensures a huge growth in employment of intelligent devices (according to a study, more than 50 billion by 2020). Keeping in mind the energy crisis, this will be possible only and only when the devices' energy consumption is minimal. Additionally IoT devices are mostly assumed to be self-governing for years. Such a model uses batteries and/or mine energy from the environment, which also will hold for very low energy consumption devices.[4] The basis of energy management shall stand upon scrutinizing elements at fundamental and ground level and controlling their energy consumption then and there. The deeper the level of control and tighter the analysis, the better shall the management model perform. The billions-and gradually trillions-of devices shall create and energy efficient network and procedures that good have been nowhere near to possible.[5] Secondly the employment of power distribution wire or, in case where battery is used, the battery's life span i.e., time period after which the battery needs to be replaced and the life cycle of the battery is a big issue. Energy harvesting model may provide a solution. This technologies use elements that generate power such as solar cells and thermoelectric elements to convert heat energy, vibration and light into electricity and then use that electricity efficiently and effectively. These technologies can be implemented now as semiconductors have attained a balance between improving results from elements that generate power and eventual decrease in consumption of power by active devices.[6]

1.4 Green IoT:

To enable and environmental friendly smart world, the IoT should practice energy efficiency. Since all the devices in the IoT environment are equipped with additional sensory devices and add-ons for communication, they will consume more energy. Additionally the growing interest and adoption from various functional units, the demand for energy will exponentially increase. All these factors sum up to make room for green IoT whose prime objective is to reduce energy usage by IoT devices, in terms of making the world smart along with sustaining the environment. Considering the efficient usage of energy as prime focus in designing, deploying, implementing and developing IoT environment, green IoT can be described as: "Adopting procedures and implementing models that are energy efficient by IoT to promote the reduction of green house

effect by existing applications and also reduction of hazardous effects of IoT environment itself. Designing, producing, utilizing and finally disposing/recycling of IoT components with procedures are the points of prime focus during the entire life-cycle of IoT, ensuring environmental sustainability such that minimal impact is experienced by the environment."

2. ICT'S ROLE IN GREEN IOT

ICT (Innovative Civil Technologies) is an umbrella term that covers any technology, application or any facility regarding communication and information empowering users with access, storage, transmitting and manipulative rights for a variety of information. The following are the ICT's regarding identification, sensing, communicating and computing IoT elements:

- RFID (Radio Frequency Identification) [7]
- WSN (Wireless Sensor Network) [8]
- WPAN (Wireless Personal Area Network) [9]
- WBAN (Wireless Body Area Network) [10]
- HAN (home Area Network) [11]
- NAN (Neighbourhood Area Network) [12]
- CC (Cloud Computing) [13]
- DC (Data Centre) [14]
- M2M (Machine to Machine) [15]

2.1 Green RFID:

Green RFID considers reducing the weight of the RFID tags leading to decrease in amount of non-biodegradable material employed in their production. Algorithms and protocols for energy efficiency and optimization of tag estimate, adjustment of dynamic transmission power level, avoiding collision of tags, preventing overheating etc.

2.2 Green WSN:

A WSN usually consist of a number of sensor nodes and a Base Station(BS) (a sink node). The nodes possess low processing ability, limited power and storing capacity, instead, the BS is

comparatively more powerful. To achieve Green WSN, following should be practised ([16],[17],[18],[19]):

- Making sensor nodes reside in sleep mode, and work only when necessary. This will prevent unnecessary consumption of energy, thus resulting in energy usage efficiency.
- Adapting techniques that reduces consumption of energy, like harvesting power from environment (e.g., kinetic energy, sun, temperature etc.);
- Radio Optimization Techniques;
- Data depletion mechanisms.
- Routing in an energy-efficient manner.

2.3 Green CC:

The practice to reduce footprint on the environment, meaning, minimization of effects on environment caused due to Cloud Computing is known as Green Cloud Computing. The components involved in these practices are both tangent as well as in-tangent, i.e., hardware as well as software. This method assess and compute the amount of impact on the environment due to the current working mechanism, using the following techniques[20]:

- Power Usage Effectiveness
- CO₂ Emissions
- Coefficient of Renewable Energy
- Thermal Power Design
- Performance per Watt
- Data Centre Infrastructure Efficiency
- Compute Power Efficiency
- Energy Usage Factor
- Water Usage Effectiveness

and based on the results, work towards the direction of controlling consumption of resources like energy, water or other exhausting resources, and also limiting the e-waste caused due the lifecycle of components.

2.4 Green M2M:

A M2M technology model, implemented with a touch of environmental sustainability is Green M2M. Making possible seamless intercommunication, interconnectivity and operability, M2M also focuses on reduction of its environment footprint. M2M is a three-step process[21]:

- 1) Collection of data.
- 2) Transmission of data.
- 3) Processing of data.

The distinguished characteristics of Green M2M are that they:

- Incur less cost.
- Employ less human intervention.
- Consume less energy.

In M2M, everything that can be connected, will eventually be. Green M2M focuses on improving decision-making and thus taking greener decisions, to consume optimum amount of energy only when required.

2.5 Green DC:

A repository for storing, managing and disseminating information in which devices are designed, manufactured and programmed to ensure maximum efficiency in energy consumption as well as minimizing its ill-effect on the environment[22]. Further study of advance technologies and strategies provide a premise for construction and conduction of a Green DC, some of which are:

- Using alternative technologies (like heat pumps, photovoltaic, etc.).
- Using hybrid vehicle or that from an electric company.
- Recycling waste and e-waste.

- Landscaping in a sustainable manner.
- Using environment friendly elements as raw materials for building, paints, etc.
- Minimizing building footprints.
- Installing backup convertors for generators.[22]

2.6 Green ICT:

Along with the above, Green ICT proposes the following:

- Turning on facilities (devices, sensors, etc.) when and where needed. This will save a lot of energy from being unnecessarily consumed.
- Transmit only meaningful and necessary data, as transmission of unnecessary or unimportant or non-meaningful data may employ much more energy, which would be sheer waste.
- Promote efficient routing by proposing algorithms that minimize the length of packet path. Also, the energy consumption by the channels and media need to be optimized.
- Using green communication techniques. This will promote in establishment of communication with simultaneously sustaining the environment.
- Using renewable resources from nature, like heat, oxygen, water, etc for energy production and utilization. This will minimize the dependency on CO₂ and oil.[23]

3. CONCLUSION

Thus, a survey on the emerging use of smart devices, reflects the estimation of exponential increase in the number of intelligent devices in near future, and hence leading to alarming increase in energy usage and detrimental effects on the environment. To prevent this technology from planting it's footprint on the environment, methods and policies are being figured out, so that there may be minimization of detrimental ill-effects of technology on the environment and resources be used wisely and optimal.

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Lightweight Cryptography

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Abstract—For the last few years it has been a very talking point because this technology enables secure and efficient communication between networked smart objects or Internet of Things as it can run on devices with low computing power. Lightweight cryptography is a key tool for creating a strong security solution for universal devices. Due to the high worth constraints of uncommonly large applications, the implementation of hardware and software is done on the basis of cryptographic algorithms for realizing the importance of pervasive computing. This paper gives an overview about lightweight cryptography (LWCRYPT) and its techniques.

Keywords—*LWCRYPT;hash function;RFID;cryptography*

1. INTRODUCTION

There are many aspects to security and many applications, ranging from secure commerce and payments to private communications and protecting passwords. One essential aspect for secure communications is that of cryptography. But it is important to note that while cryptography is *necessary* for secure communications, it is not by itself *sufficient*. The reader is advised, then, that the topics covered here only describe the first of many steps necessary for better security in any number of situations.

2. THE PURPOSE OF CRYPTOGRAPHY

Cryptography is the process of writing in secret code and is widely used now a days ; the first documented implementation of cryptography in writing dates back to circa 1900 B.C. was when an Egyptian user used an inscription by non standard hieroglyphs. Some professionals disagree that cryptography appeared immediately sometime after writing was invented, with

applications ranging from strategic missives to battle time plans. It is no wonder, then, that modern types of cryptography came soon after the far reaching development of computer communications. In data and telecommunications, cryptographic process is necessary when communicating over any illegal medium, which involves just about *any* network, mostly the Internet[1].

Within the incident of any application-to-application communication, there are some particular security requirements, including:

- *Authentication*: The process of confirming one's identity. (The essential forms of host-to-host authentication on the Internet today are address-based or name-based, both of which are weak.)
- *Privacy/confidentiality*: Confirming that no one can read the message except the receiver.
- *Integrity*: Ensuring that receiver that received the message has not been modified in any way from the original.
- *Non-repudiation*: A mechanism which proves that the sender really sent this message[2].

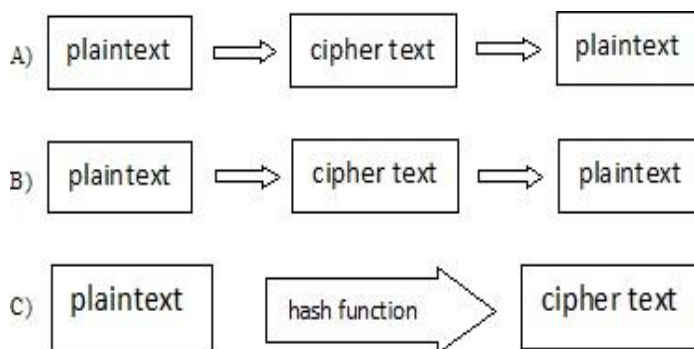
Cryptography, then, not only provides protection of data from alteration or theft, but can also be used for user authentication. There are mostly three types of cryptographic schemes usually used to achieve these goals: Hash functions, secret key cryptography, public key cryptography each of which is described below. In all cases, the initial original data can be referred as *plaintext*. First of all, it is encrypted into *cipher text*, which is then decrypted into usable plaintext.

In many of the explanations below, two interacting parties will be termed as Alice and Bob; this is the casual nomenclature in the crypto science and literature to make it easier to identify the interacting parties. If there is a third or fourth party to the interaction, they will be referred to as Dave and Carol. Mallory is a malicious party, Eve is an eavesdropper, and Trent is a trusted third party

3. TYPES OF CRYPTOGRAPHIC ALGORITHM

There are various ways of categorizing cryptographic algorithms. For purposes of this paper, they will be classified based on the number of keys that are engaged for encryption and decryption, and further defined by their application and implementation. The three types of algorithms that will be discussed are (Figure 1):

- Secret Key Cryptography (SKC): Uses a single key for both encryption and decryption
- Public Key Cryptography (PKC): Uses one key for encryption and another for decryption
- Hash Functions: Uses a mathematical transformation to irreversibly "encrypt" information



A) Symmetric Key (Secret key) cryptography or SKC uses single key for both encryption and decryption.

B) Asymmetric Key (Public key) cryptography or AKC (PKC) uses two keys, one for encryption and other for decryption.

C) Hash function (One-way cryptography). Hash function has no key since the plaintext is not recoverable from the ciphertext.

Figure 1: Three types of cryptography: secret-key, public key, and hash function[1].

3.1 RFID-Radio Frequency Identification

A radio-frequency identification system uses *tags*, or *labels* attached to the objects to be identified. Two-way radio transmitter-receivers called *interrogators* or *readers* send a signal to the tag and read its response.

RFID tags can be either passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. However, to operate a passive tag, it must be illuminated with a power level roughly a thousand times stronger than for signal transmission. That makes a difference in interference and in exposure to radiation[10].

RFID products have been widely implemented and deployed in many aspects in our daily life, e.g. automated production, access control, electronic toll collection, parking management, identification and cargo tracking. The need for security in RFID and sensor networks is dramatically increasing, which requires secure yet efficiently implementable cryptographic primitives including secret-key ciphers and hash functions. In such constrained environments, the area and power consumption of a primitive usually comes to the fore, and standard algorithms are often prohibitively expensive to implement[9].

4. LIGHTWEIGHT CRYPTOGRAPHY

Lightweight cryptography is a very interesting topic for the last some years, driven by the lack of basics capability to run on devices with very low computing power. We can think for instance of RFID tags, sensors in wireless sensor network or, most probably, small internet enabled gadgets expected to flow the markets as the Internet of Things (IoT) arises. On the basis of lightweight cryptography is a trade-off between lightweightness and security: how can we aim at high levels of security using only a little computing power? Many cryptographers have addressed these problems by suggesting block ciphers, lightweight stream ciphers hash function and recently one-pass authenticated encryption[3]

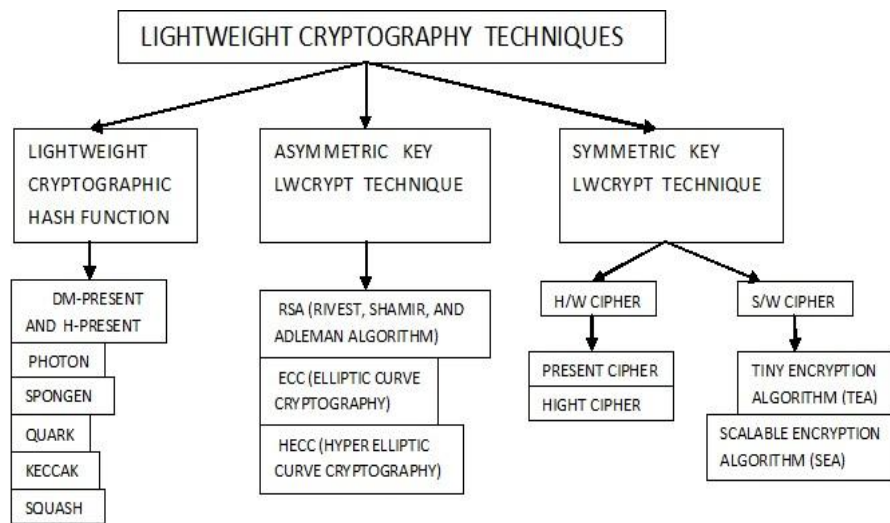


Figure.2: Lightweight Cryptography Techniques

Cryptographic technologies are speeding up now days: new technologies on attack, structure and implementation are greatly studied. One of the state-of-the-art techniques is “Lightweight Cryptography (LWC)”. Lightweight cryptography is a cryptographic algorithm or protocol costumed for usage in constrained environments including contactless smart cards, sensors, health care devices RFID tags, and so on.

5. TYPES OF LIGHTWEIGHT CRYPTOGRAPHY HASH FUNCTION

5.1 DM-PRESENT AND H-PRESENT

Article: Lightweight Cryptography: Cryptographic Engineering for a Pervasive World, Poschmann's PhD thesis (09)[11] Author: Poschmann, Alex DM-PRESENT is simply a Merkle-Damgård scheme where the compression function is the block cipher PRESENT in Davies-Meyer mode. DM-PRESENT-80 is based on PRESENT-80 and DM-PRESENT-128 on PRESENT-128. No security claims are made about collision or second preimages as we can read in Section 6.5.1 of Poschmann's PhD Thesis[11]:

Such hash functions will only be of use in applications that require the one-way property and 64-bit security[7].

5.2 PHOTON:

Photon is a P-Sponge based on an AES-like permutation. For the smallest security parameter (PHOTON-80/20/16), the bitrate during absorption is 20 but it is equal to 16 during the squeeze

ing phase. The throughput figures given correspond to throughput when outputting long messages as these are the ones usually given. However, the figures for shorter messages are smaller (i.e. better) for PHOTON.

The design of the permutation used to update the sponge is close to the LED cipher which was designed later by the same people. As said above, the AES was also a great influence. More information on this primitive (including a reference implementation) can be found on the website (<https://sites.google.com/site/photonhashfunction/home>) set up by its authors[7].

5.3 SPONGENT:

A part of lightweight hash functions with hash sizes of 88 (for pre image resistance only), 128, 160, 224, and 256 bits based on a sponge structure instantiated with a present-type modification, following the hermetic sponge strategy. Its smallest usages in ASIC require 738, 1060, 1329, 1728, and 1950 GE, respectively. To our best knowledge, at all security levels attained, it is the hash function with the smallest footprint in hardware published so far, the parameter being highly technology dependent. spongent offers flexibility in terms of speed and serialization degree. We found some of its various implementation trade-offs[4].

The sponge construction is a process to build a hash function from a publicly known random function (T-Sponge) unkeyed permutation (P-Sponge). It was introduced by Bertoni et al., the *Keccak team*, in 2007 [6]. Sponges can also be used to provide authenticated encryption or stream ciphers.

5.4 QUARK: QUARK is a part of cryptographic "sponge" functions designed for resource controlled hardware environments, as RFID tags. QUARK minimizes power consumption and area, yet offers high level security assurance.

We propose three instances of QUARK: D-QUARK, S-QUARK, and U-QUARK were designed to provide at least 64-, 80-, and 112-bit security against all intruders (collisions, second pre images, length extension, multicollisions, etc.).

The table below defines the simulated hardware performance of QUARK, when implemented in 0.18 μ m ASIC (area is given in gate-equivalents, power is the peak power). Security means a security of m bits against collision and second preimage attacks, and of n bits against preimage attacks.

Hash function	Security (bits)	Area (GE)	Speed (kbps)	Power (μ W)
Compact architecture @100 kHz				
U-QUARK	64, 128	1379	1.47	2.96
D-QUARK	80, 160	1702	2.27	3.95
S-QUARK	112, 224	2296	3.13	5.53
High-speed architecture @714 KHz				
U-QUARK	64, 128	3032	84	37.01
D-QUARK	80, 160	3561	130	43.35
S-QUARK	112, 224	6220	357	75.27

Fig. 1. Hardware performance of QUARK[5]

5.5 KECCAK:

Keccak is a part of sponge functions. The *sponge function* is a summarization of the concept of cryptographic hash function with infinite output and can implement quasi all symmetric cryptographic functions, from hashing to pseudo-random number generation to authenticated encryption.

As the basics used in the sponge construction, the Keccak instances call one of seven permutations named Keccak- $f[b]$, with $b=25, 50, 100, 200, 400, 800$ or 1600 . In the scope of the SHA-3 contest, we proposed the largest permutation, namely Keccak- $f[1600]$, but smaller (or more “lightweight”) permutations can be used in constrained environments. Each permutation consists of the iteration of a simple round function, similar to a block cipher without a key schedule. The choice of operations is limited to bitwise XOR, AND and NOT and rotations. There is no need for arithmetic operations, table-lookups, or data-dependent rotations[6].

5.6 SQUASH:

SQUASH is based on the one-way function $c = m^2 \bmod n$ coming from the Rabin

cryptosystem. To make it secure, the binary length of n must be at least 1000 bits long. In , the author suggests using a 64-bit non-linear feedback shift register to generate m , a not yet factorized Mersenne's number $(2^x - 1)$ as modulus n , and to send out the bits of c without storing them. This process avoids storing three 1000-bit long numbers. The multiplications are achieved by on-the-fly convolutions, sending each bit as soon as it is computed. Consequently, the only needed memory aims at storing the carry of the previous steps in the convolution. For the output, a window of 32 or 64 (or more) bits in c is used. It yields a hash function with inputs of 64 bits that is scalable in output[8].

Conclusion

Lightweight cryptography provides a high level security of smart objects networks because of its efficiency and smaller footprint. We permit that lightweight native should be considered to be implemented in the networks. Especially, lightweight block ciphers are practical to use now.

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The Performance Optimization & Analysis of OFDM Communication System with various modulation schemes

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Abstract— With the development of advance technologies in the field of wireless communication there is a need of large bandwidth, fast communication with zero noise reception. With the use of IEEE 802.11a standards, OFDM based system is capable of providing high data rates of 54 mbps that makes it useful for wider bandwidth and noise free speed communication in WLAN. Global warming is the today's common issue because of the widely used mobiles and transmission data rates are increasing day by day with the rapid increase of wireless communication therefore today's need is to provide a technique which provide high efficiency of data and reduced energy. The proposed system provides the better tradeoff for having reduced bit error rate and high SNR so that to have high efficiency of the system. In this system we design a 802.11a WLAN for BPSK, Qpsk, Qam modulation scheme with different coding rate $1/2$ & $3/4$. For every modulation by changing the value of signal to noise ratio we find the point at which the bit error rate is zero. By plotting the graphs for each modulation scheme between bit error rate on y axis & signal to noise ratio at x axis, we evaluate which system is superior. By comparing graphs we conclude that the Qam256 modulation at $3/4$ coding rate is superior than other modulation scheme & the signal to noise ratio is 14.

Keywords— *GSM, PDC (personal digital cellular), LAN , WAN , WPAN.OFDM, BER,SNR*

I. INTRODUCTION

Today, the fast growing wireless local area networks has opened up a new market for wireless solutions. The IEEE 802.11a is a standard released in 1992, for high-speed wireless data transfer. In the types of communications services provided to users

and the infrastructure needed to support those services, the past decade has shown major changes. The solution to the requirements of mobility with connectivity is provided by wireless communications. Thus, there has been tremendous growth in the field of wireless communications along with the growth of the Internet. This is due to other inherent benefits of wireless, such as decrease in wiring complexity, increase in flexibility, and ease of installation. WLANs or mobile technologies based on 2G/2.5G standards are the main reason behind the growth of wireless. Voice services and some data services are provided by these technologies at low data rates. It then extended to 3G systems that provide higher data rates with a throughput of 2 Mbps maximum. WPANs are complementary to WLANs, which provide networking of wireless data within a short range of 10m at data rates of about 1 Mbps. A new forum of access technology is provided by WLANs, in the LAN world. Several practical requirements are fulfilled by the new access technology.

1.WIRELESS TECHNOLOGY

In our everyday business and personal lives wireless technologies have become increasingly popular. Calendars, e- mail, address and phone number lists and the Internet are all features given by Personal digital assistants (PDA). Global positioning systems (GPS) are offered by some technologies that can pinpoint the location of the device anywhere in the world. More features and functions are promised by wireless technologies in the next few years. Radio frequency transmissions are used as the means for transmitting and receiving data over the air in case of wireless technologies, whereas cables are used in wired technologies. The range of wireless technologies grows from complex systems, such as wireless local area networks (wlan) and cell phones to the devices that do not process or store information such as wireless headphones, microphones, infrared devices are also included by them, which require a direct line of sight between the transmitter and the receiver to close the link. for eg. remote controls, cordless computer keyboards and mice,etc. Wireless communications offer many benefits for the organizations and users such as lower installation costs, increased productivity, and portability and flexibility. A broad range of differing capabilities are covered by wireless technologies toward different uses and needs.

2.WIRELESS STANDARDS

IEEE 802.11 standard is decided for WLANs, whereas the IEEE is first developed in 1997. To address mobile and portable stations and to support medium and higher data rate applications the IEEE designed 802.11. For 1 Mbps to 2 Mbps wireless transmissions the original WLAN standard 802.11 is designed. Further it followed by 802.11a in 1999, in which a high-speed WLAN standard for the 5 GHz band is established and 54 Mbps data rate is supported. The 802.11b standard which operates in the 2.4 - 2.48 GHz band has also been completed in 1999 and it supports 11 Mbps data rate. The dominant standard for WLANs is the 802.11b standard which is currently used, it provide sufficient speed for most of today's applications. The security weaknesses in the standard have been exposed because of the 802.11b standard which has been so widely adopted now days. Then next new standard is

802.11g which operates in 2.4 GHz waveband. Most of the current WLAN products are based on the 802.11b standard operate.

3.WIRELESS NETWORK

Wireless technology has been the most sought after in the recent years mainly due to the most obvious advantage of its mobility. Wireless network offers a user to connect to the existing network and move freely within the coverage area. Wireless network can also make network deployment easily and rapidly. It does not involve running cables for each user. There are two types of wireless network - infrastructure network and ad hoc (infrastructure less) network. In the infrastructure network, each node communicates with the base stations providing internodes routing and fixed network connectivity. So for each node in the network, there should be at least one base station in its range of transmission. Due to Base stations one or more transmission channel for mobile nodes located within its coverage area is being coordinated. In an ad hoc network, every node communicates with other nodes directly or indirectly through intermediate nodes that relay its packets because of transmission power limit. Thus, all nodes are virtual routers participating in computing and maintaining the routes. The main advantages of ad hoc network are convenience and low cost as no base station or fixed network infrastructure is required. An ad hoc network is very useful for places where pre-deployment of infrastructure is difficult or even impossible and one scenario often mentioned is in a meeting room without access point deployed, the

notebooks equipped with 802.11. Wireless LAN card can form a temporary ad hoc network to share the files. An ad hoc network is capable of operating autonomously and is completely self organizing and self-configuring. Therefore, it can be rapidly and easily deployed. Another important property of an ad hoc network is multi-hop capability.

4.OSI MODEL

The International Standards Organization (ISO) defined as Open Systems Interconnection (OSI). is a model that provides architecture to transfer a message from one user to another user. It consists of seven layers they are as follow:

- 1) Application: Provides different protocol for different services to the applications
- 2) Presentation: Converts the data to information for translation, compression
- 3) Session: It manages user session such as creating & closing session between end-user processes
- 4) Transport: It provides connection/connectionless protocol for transporting a packet between two user
- 5) Network: Routes the data in the network
- 6) Data Link: Provides error control between adjacent models.
- 7) Physical: It transmits the raw bits to transmission media

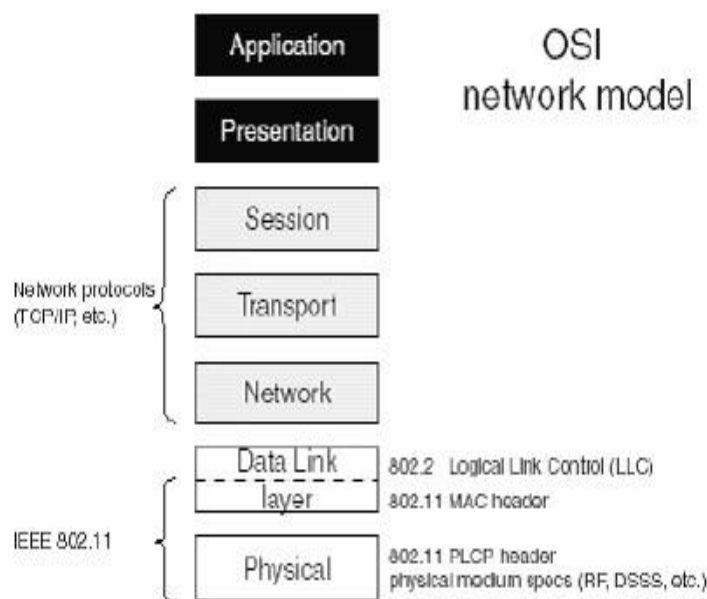


Figure1: OSI model

The IEEE 802.11a standard focuses on the bottom two layers of the OSI model: data link layer and physical layer.

5. Orthogonal Frequency Division Multiplexing

The promising technique to achieve high data rate and combating multipath fading is Orthogonal frequency division multiplexing (OFDM), in wireless communications. OFDM can also be known as a hybrid of multi-carrier modulation (MCM). The principle of transmitting data is MCM which is obtained by dividing parallel bit streams into several stream and each of these data streams are modulating into individual carriers or sub carriers (SCs). FSK modulation is a technique whereby from a set of orthogonal carriers data is transmitted on one carrier for each symbol duration. Orthogonality is achieved by separating the carrier by an integer multiples of the inverse of symbol duration of the parallel bit stream amongst various carriers. All the orthogonal carriers are transmitted with OFDM, simultaneously. In other words, the aggregated sum of the narrow orthogonal sub bands occupies the entire allocated channel. The symbol duration is increased proportionately by transmitting several symbols in parallel, through which the effects of ISI (Inter Symbol Interference) reduces. One of the applications of a parallel-data- transmission scheme is OFDM, through which the influence of multipath fading is reduces and makes complex equalizers unnecessary.

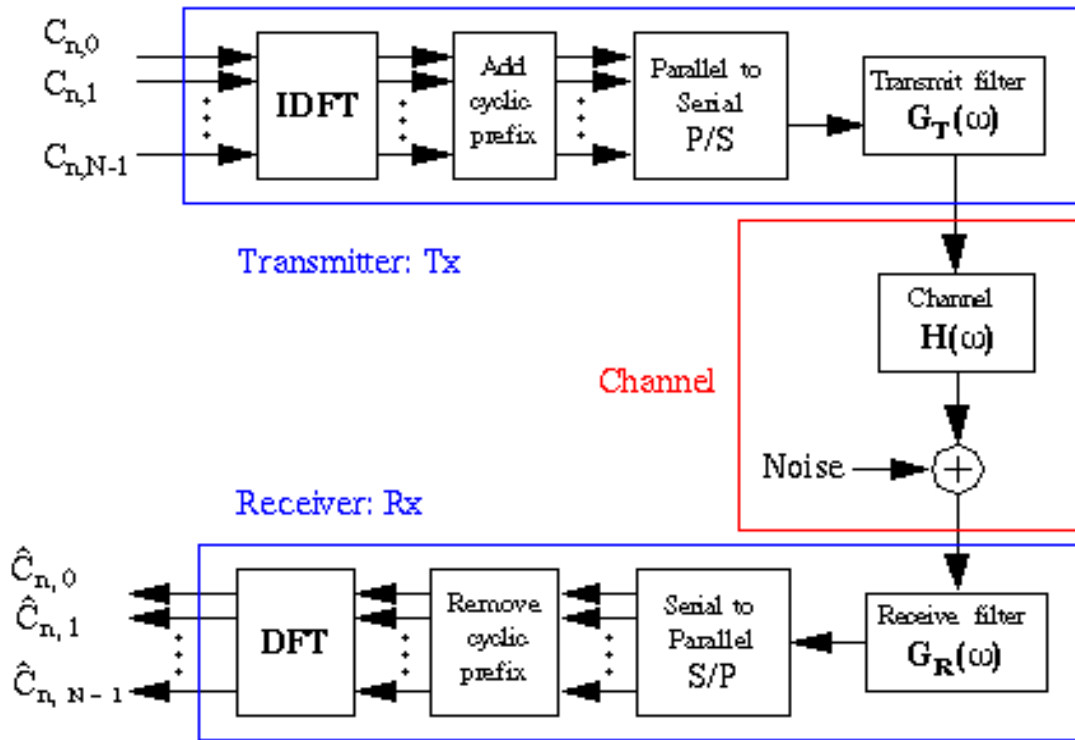


Fig.2 Block Diagram of OFDM Transmitter and Receiver

The total signal frequency band is divided into N non overlapping frequency in a classical parallel-data system. The modulation of each symbol is separated with a separate symbol, and then the N sub channels are frequency multiplexed. To avoid spectral overlap of channels and to eliminate inter channel interference it seems good. However, this leads to inefficient use of the available spectrum. The ideas proposed in the mid-1960s, to cope up with the inefficiency and to use parallel data and FDM with overlapping sub channels where each carrying a signaling rate, to avoid the use of high-speed equalization it is spaced apart in frequency, multipath distortion and impulsive noise is combated, as well as to use the available bandwidth fully. In order to create the OFDM symbol a serial to parallel block is used to convert N serial data symbols into N parallel data symbols. Then each parallel data symbol is modulated with a different orthogonal frequency subcarriers, and added to an OFDM symbol.

II. OFDM PARAMETERS

The main parameters of the OFDM standard are listed in Table.1. Guard interval (GI) of 800 ns is a key parameter through which the choice of the other parameters is largely determined. Robustness to RMS delay spreads is provided by this GI of up to several hundred nanoseconds, depending on the modulation technique and coding rate used. Practically, this means that in any indoor environment this modulation is robust enough to be used, including large factory buildings. Although to reduce the delay spread to an acceptable amount and increase the range to an acceptable amount directional antennas may be used. It can also be used in outdoor environments. The symbol duration is chosen as 4 μ s to limit the amount of power and time spent on the guard time to 1 dB. The SC spacing at 312.5 kHz is also determined, which is defined as the inverse of the symbol duration minus the guard time. Uncoded data rates of 12 to 72 Mbps can be achieved by using 48 data SCs, by using variable modulation types from binary phase shift keying (BPSK) to 256-QAM. Each OFDM symbol contains an additional four pilot SCs in addition to the 48 data SCs, which can be used to track the residual carrier frequency offset during the training phase of the packet that remains after an initial frequency correction. Forward error correction (FEC) across the SCs is used to correct for SCs in deep fades, giving coded data rates are from 6 to 54 Mbps.

Table .1: Main Parameters of the OFDM Standard

Sr. No.	Information Data Rate	6,9,12,18,24,36,48 and 54 Mbits/sec
1.	Modulation	BPSK,QPSK,QAM
2.	Error Correcting Code	K = 7(64 states)
		Convolution
3.	Coding Rate	1/2, 2/3, 3/4
4.	Number of Sub carriers	52
5.	OFDM symbol duration	4 microsec
6.	Guard Interval	0.8 microsec
7.	Occupied Bandwidth	16.6 MH
8.	SC spacing	312.5 kHz

MATLAB R2010a and SIMULINK tool is used to perform this simulation, using 1/2, 2/3 and 3/4 code rate as per the table provided the simulation model is designed for AWGN channel with modulation technique such as QAM.

III. STEPS OF SIMULATION

Different modulation schemes for the various parameters set for the simulation are shown in figure. The Puncture vector was changed and the number of bits per frame was altered according to the code rate

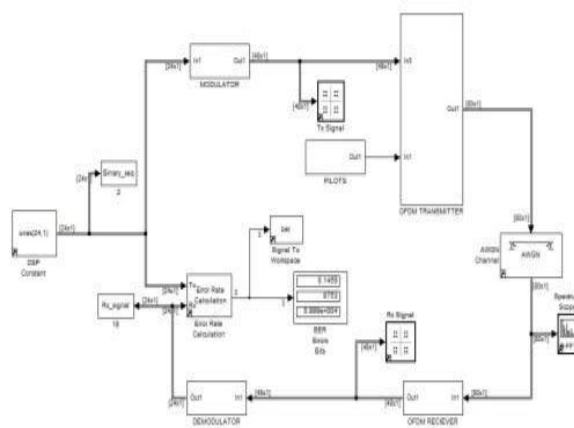


Figure3:Simulink model for awgn channel Modulator

It Consist of various essential block which are explained as follows:

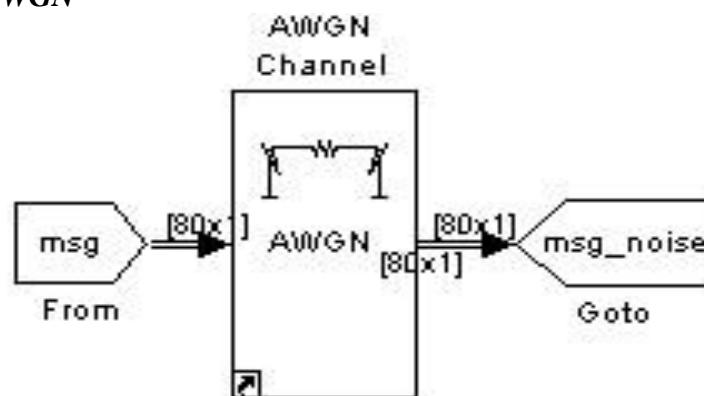
- 1) Convolution Encoder
- 2) Puncture
- 3) Matrix Interleaver
- 4) General Block Interleaver
- 5) QAM-256

1.Principle of OFDM Transmission

Orthogonal Frequency Division Multiplexing (OFDM) is a multiplexing technique that divides a channel with a higher relative data rate into several orthogonal sub-channels with a lower data rate. For high data rate transmissions, the symbol duration T_s is short. Therefore ISI due to multipath propagation distorts the received signal, if the symbol

[illegible]

2. Noise Medium AWGN



White Gaussian noise is added to the AWGN Channel block to a real or complex input signal. When the input signal is real this block add real Gaussian noise and produces a real output signal. This block adds real Gaussian noise when the input signal is complex and

produces a complex output signal. Its sample time is inherited by this block from the input signal.

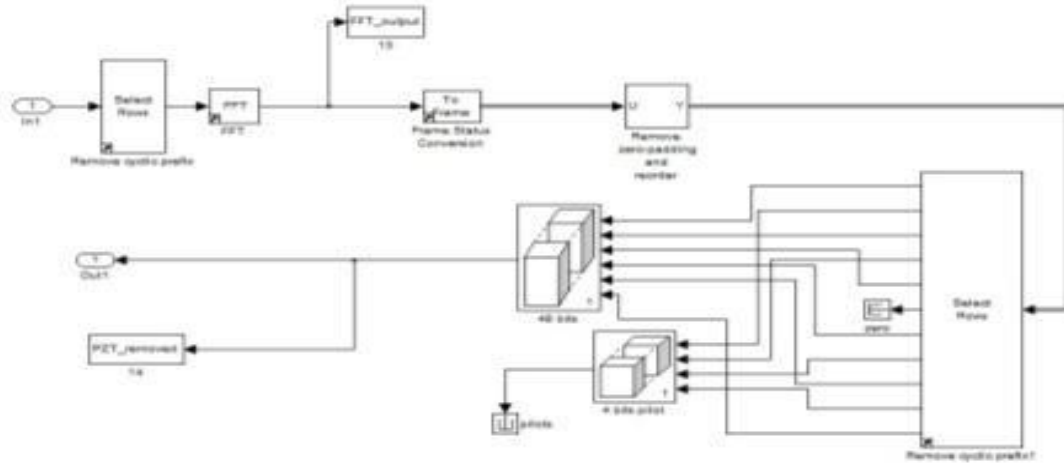


Figure7: Block diagram Ofdm receiver

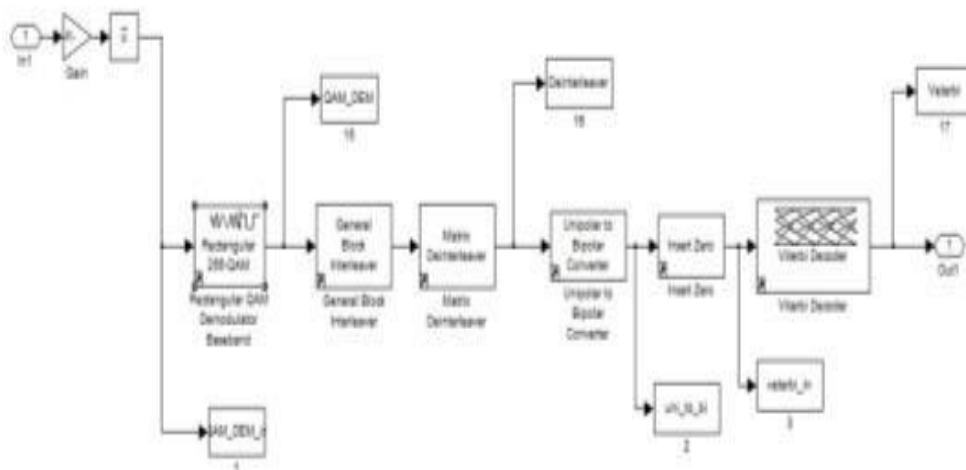


Figure8: Block diagram demodulation

The demodulator subsystem performs the inverse tasks of the modulator subsystem.

3. ERROR CALCULATION

It contains two input & one output out of which two input are actually transmitted and actually received respectively out. The error rate calculation block calculates the bit error rate, by comparing the received data with transmitted data. It has three inputs, Tx and Rx port that are used to accept transmitted and received signals and the third port is used to indicate the related frame for computation. This simulation is done with Matlab and

Simulink as the tool. The simulation model is designed for AWGN channel with modulation technique such as qam256 using $\frac{1}{2}$, $\frac{2}{3}$ and $\frac{3}{4}$ code rate. Table 4.2 gives the main OFDM parameters in 802.11a standard, which we used in for this simulation. The qam256 scheme is simulated for $\frac{2}{3}$, $\frac{3}{4}$ code rate instead of $\frac{1}{2}$ code rate.

RESULT

Qam256 Performance in case of AWGN channel for code rate $\frac{2}{3}$ and $\frac{3}{4}$.

IV. CONCLUSION

The performance of the OFDM based IEEE 802.11a WLAN has been examined in this project under AWGN fading channel condition and BPSK modulation scheme at code rate ($\frac{2}{3}$, $\frac{3}{4}$). In practical fading environmental condition while transmitting the signal, the inter symbol interference is caused due to the occurrence of multipath fading effects occurs which causes. By using Guard interval the effect of inter symbol interference can be reduced and system performance can be improved. Qam256 performance is superior as compared to other schemes. The cyclic extension of the guard period matches the time of the tolerable delay spread. The BER rises rapidly due to the inter symbol interference. The obtained experimental and simulation result shows that the performance of system at code rate $\frac{3}{4}$ is better, than code rate $\frac{2}{3}$. Also BER approaches at zero when SNR is 14dB at code rate $\frac{3}{4}$. It shows that the performance is better when code rate of Qam256 modulation scheme is $\frac{3}{4}$. Two possible approaches are suggested by approaches that can be implemented in 802.11a to cope with the problem of inadequate channel compensation. Channel estimation equalization technique is the first approach calls for more advanced as compared to what is currently implemented in the commercially available 802.11a wireless cards. Modifications at the upper layers of the OSI model are the second approach. Basic coding rate is $\frac{3}{4}$ in IEEE 802.11a WLAN. Number of bits is to be punctured by increasing coding rate, at the transmitting and at receiving section, that punctured bits are filled by zero bits. Because of this, distortion occurs at the receiver which causes the bit error rate degradation as seen from the results.

VI. FUTURE SCOPE

Future research includes possible topics:

1. Use of different fading channels such as Rician and Rayleigh can be taken into account for the modulation schemes.
2. The comparison of performance among different 802.11x standards is investigated as a future work.
3. On various topologies existing techniques can be implemented can be considered
4. Use of fuzzy logic, neuro-fuzzy for the system

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.SURVEY PAPER ON CLOUD COMPUTING AND ITS EFFECTIVE UTILIZATION WITH SECURITY THREATS

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Abstract : Today, the development of various system in science and technology is growing rapidly, One of the emerging trend is cloud computing. It is a buzzword in the field of computer science and Information Technology which provide convenient and on-demand services to requested end users. Users can use this internet based system in lower cost. It is leveraging to the users in allows users to use the applications. Cloud computing provides various services like SASS, PASS, HASS, IASS. According to these services there is no need to keep more hardware, infrastructure, software personally, only they need personal laptop and internet connection in order to access the services of the cloud. Cloud manages the services according to requirement. The marketplace of the cloud computing security concerns, particularly data security and privacy protection issues, remain the primary inhibitor for acceptance of cloud computing services. This paper will focus on the introductory part of the cloud computing and a special aspect of the cloud computing i.e. Security in cloud computing.

I. INTRODUCTION

Cloud computing is at present the buzzword in IT industry, and many are interested to know what cloud computing is and how it works. More so because the term CLOUD is fascinating and some people even surprise how do clouds that rain can even remotely be used in Computing.

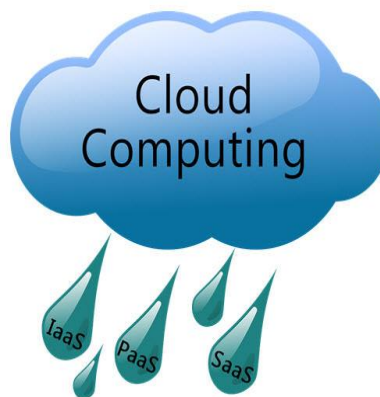


Figure 1.1 Cloud Computing [15]

1.1 Why Cloud Computing?

With enhance in computer and mobile user's, data storage has become a main concern in all fields. Big and small scale businesses today flourish on their data & they spent a huge amount of money to maintain this large amount of data. It needs a strong IT support and a storage capacities. Not businesses can afford high cost of in-house IT infrastructure and support services. For them Cloud Computing is a very cheaper solution. Perhaps its effectiveness in storing data, computation and less maintenance cost has attract even superior businesses as well.

Cloud computing is decreases the hardware and software require from the user's side. The only thing that user must be know to run is the cloud computing systems interface software, which can be as easy as Web browser, and the Cloud network takes care of the rest. We all have experienced cloud computing at some moment of time, some of the popular cloud services we have used or we are using are mail facilities like gmail, hotmail or yahoo etc.

1.2 Types of Clouds

There are four different cloud models that you can subscribe according to business needs:



Figure 1.2 Types of Cloud [15]

1.2.1 Private Cloud: Here, computing resources are deployed for one particular organization. This method is more used for large-business interactions. Where the computing resources can be governed, owned and operated by the same organization.

1.2.2 Community Cloud: cloud computing resources are provided for a society and organizations.

1.2.3 Public Cloud: This type of cloud is used usually for Business to Consumer and other type business interactions. The cloud computing resource is owned, governed and used by government, an academic or business organization.

1.2.4 Hybrid Cloud: This type of cloud can be used for both type of contacts - B2B (Business to Business) or B2C (Business to Consumer). This consumption method is called hybrid cloud as the computing sources are bound collectively by different clouds.

1.3 Cloud Computing Services

The three major Cloud Computing Services Offerings are

- **Software as a Service (SaaS)**
- **Platform as a Service (PaaS)**
- **Infrastructure as a Service (IaaS)**

Business are use some or of these components according to their requirement.

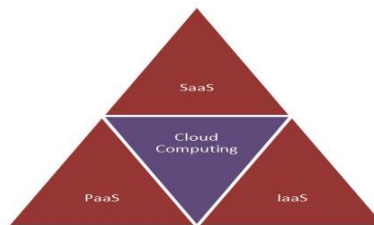


Figure 1.3 Cloud Service Model[15]

1.3.1 SaaS (Software as a Service)

Software as a service (SaaS) is a software distribution model in which applications are run by a vendor or service provider and made accessible to customers over a network (internet). Software as a Services is becoming an more and more prevalent delivery model as underlying technologies

that supports **Service Oriented Architecture (SOA) or Web Services**. By internet this service is available to users anywhere and anytime in the world.

conventionally, software application needed to be purchased upfront & then installed it onto your computer. Software as a Services users on the other hand, in its place of purchasing the software subscribes to it, usually on monthly basis via internet. Anyone who needs an access to a particular piece of software can be subscribe as a user, whether it is one or two people or every thousands of employees in a corporation. SaaS is compatible with all internet enabled devices. Many important tasks like sales, invoicing, accounting and planning all can be performed using SaaS.

1.3.2 PaaS (Platform as a Service)

Platform as a service, is known as PaaS, it provides a platform and environment to permit developers to build applications and services. This service is hosted in the cloud and user by the users via internet. PaaS services are continuously reorganized & new features added. Software developers, web developers and business can take benefit from PaaS. It provides different platform to support application development. It includes management services and software support ,networking storage, , deploying, hosting, testing, collaborating, and maintaining applications.

1.3.3 IaaS (Infrastructure as a Service)

Infrastructure As A Service (IaaS) is one of the fundamental service model of cloud computing at the side of Platform as a Service(PaaS). It provides way in to computing resources in a virtualized environment “the cloud” on internet. It provides computing infrastructure like network connections, virtual server space, load balancers bandwidth, and IP addresses. The hardware resource is extracted from more than one server and networks usually distributed across numerous data centers. Its provides redundancy and reliability to IaaS.

1.3.4 IaaS(Infrastructure as a service) is a total package for computing. For small businesses who are looking for cutting cost on IT infrastructure, Infrastructure as a Services is one of the solutions. yearly a lot of money is spent in maintenance and buying new components like hard-drives, network connections, external storage device etc. which a business owner could have saved for other expenses by using IaaS.

1.4 Cloud Computing Architecture

Cloud computing comprises of two components back end and front end. Front end consist client part of cloud computing system. It comprise of interfaces and applications that are required to access the cloud computing platform.

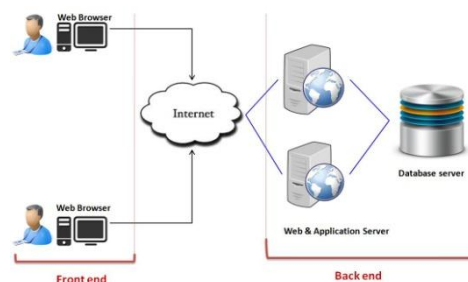


Figure 1.4 Front and back End [15]

Though back end refers to the cloud itself, it comprises of the resources that are needed for cloud computing services. It consists of servers, virtual machines, security mechanism, data storage etc. It is under providers control.

Cloud computing distributes the file system and spreads over multiple hard disks and machines. Data is never stored in one place and in case one unit fails the other will take over automatically. The user disk space is allocated on the distributed file system, while another important component is algorithm for resource allocation. Cloud computing is a strong distributed environment and it deeply depends upon strong algorithm.

2. REVIEW STUDY ON CLOUD COMPUTING SECURITY :

In this paper author propose to adopt an adaptive model-based approach in tackling the cloud security management problem. This models will help in the problem abstraction and the capturing of security requirements of different stakeholders at different levels of details. Addictiveness will support in delivering an dynamic, integrated and enforceable cloud security model. The feedback loop will calculate the security status to help improving the cloud security model and care cloud consumers aware with their assets' security status (applying the trust but verify concept)[1] should develop the application which provides encrypted data for the security. So additional security from enterprise is not required and all security burdens are placed on cloud vendor. IT leaders must define strategy and key security elements to know where the data encryption is needed. In order to reduce threats, vulnerability, risk in cloud environment, consumers can use cryptographic methods to protect the data, information and sharing of resources in the cloud computing [2]

The cloud computing framework is a revolutionary: virtualization security, data security and privacy protection is the key and difficult point problems in cloud computing. Cloud security will be get development based on the traditional security technology.[3] This paper is an effort to discuss regarding cloud computing security issues and Challenges. An attempt is made to investigate cloud-computing susceptibility, security issue cloud computing faces and presented the safety objective that needs to be accomplished. It is observed that security-sensitive applications of a Cloud computing needs high degree of security however, cloud computing are innately sensitive to security attacks. Hence, it is essential to create them more safe and robust to

adapt to the rigorous needs of these networks. As we can see the current situation, which shows that there's common bent in cloud computing is toward mesh architecture and huge scale.[4]

In this paper author, implementation of the DES algorithm takes place to generate first level encryption. And then we apply the RSA algorithm on the encrypted output of DES algorithm to generate second level encryption. And same process takes place for decryption using inverse DES and RSA algorithms. Means we applied multilevel Encryption and Decryption to provide security for cloud storage data.[5]

In this paper author suggest four typical aspects of technical solutions for operators Continuation Mechanism : The security solution of service migration from non-cloud platform to cloud platform -

IDM : Simplified authentication management for cloud environment and end-to-end trustable access technology

Data security : Data transmission, data isolation, data wiping virtualization security: Virtualization Machine Monitoring (VMM) security, Virtual Machine (VM) security, and virtualization network security.[6]

CONCLUSION AND FUTURE WORK

In this review paper, we have shown various security model like adopt an adaptive model-based approach in tackling the cloud security management problem, Cryptography methods for data security, Encryption and Decryption of data, operators Continuation Mechanism. In future we are going to introduce new security model base on cryptography algorithm and data mining tools.

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Classification of Cross-Layer protocols in Wireless Sensor Networks

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ABSTRACT

Wireless sensor network is an emerging field. A lot of work has been done in this field and still researchers are working in this area. Wireless sensor network constitute of a large number of sensors that are densely deployed. Keeping in view the WSN domain, an attempt has been made to classify the cross layer protocols so as to bring out open issues. Nowadays cross layer proposals are being used to get rid of challenges of WSN. The major challenges in WSN includes limited battery life, less memory, less computation and higher error rates. Among all the challenges, network lifetime is the critical issue. Research is being conducted to improve the network lifetime by minimizing energy consumption. In this paper, various cross layer approaches for WSNs are reviewed and we presented a classification of different cross layer protocols on the basis of their interactions between the layers.

Keywords: Wireless Sensor Networks, Cross-Layer, Energy Efficiency

1. INTRODUCTION

Wireless Sensor Networks is made up of a large number of sensors which are used for sensing the environment. It is a self organizing wireless network and is distributed over the interest area[1]. A sensor node is very light, tiny and portable. It is typically equipped with a transducer, a radio transceiver, a microcontroller and a power source which is usually a battery.

Initially, WSN is used for military applications like battlefield surveillance. But as the time goes WSN are widely used in many applications like machine health monitoring, habitat monitoring, health care applications, disaster management, home automation, environmental monitoring etc.

Since sensor nodes have limited battery power and they are required to operate for months to years. So, energy consumption by a sensor node is one of the major and critical issue. Energy conservation is the

most important factor of research in the field of wireless sensor networks. Lifetime of WSN is the critical criteria. Hence, solutions that were developed need to be energy efficient.

2. SOURCES OF ENERGY WASTAGE

The sources which cause energy consumption of a sensor node or whole network are as follows:

- 1) **Idle listening:** Listening to receive any packet that is not sent.
- 2) **Overhearing:** Listening to packets that is not destined for them.
- 3) **Collisions:** When multiple nodes try to transmit simultaneously, then collision occurs and the transmitted packet gets corrupted and then re-transmission occurs which consumes more energy.
- 4) **High transmission power:** It also leads to wastage of energy.
- 5) **Control packet overhead:** Sending and receiving control packets also leads to wastage of energy.

3. TRADITIONAL vs CROSS LAYER APPROACH

In the traditional network design approach(fig.1), each layer of the stack operates independently. This traditional design approach focuses on a particular layer without considering the parameters of the rest of the stack. This results in sub-optimal performance of applications. Authors in [2] describe layered architecture of Wireless Sensor Networks protocol stack.

To cope up with these, cross layer approach(fig.2) has been found to address power related issues in wireless sensor networks. This information is exchanged among the layers and in this way inter layer interaction is done. There exist a variety of single layer energy efficient solutions for different layers of protocol stack but none of the solution can minimize energy consumption well, since energy consuming factors are distributed across the layers of the stack. A cross layered design[2] seems to be the best approach to overcome with the energy consumption problem.

Cross layer design states that parameters of one layer is used in another layer to conserve energy. We have an energy optimization objective and in order to achieve this, cross layer design is an effective approach. Different solutions for cross layer design has already been proposed and at least in

simulations, they proved to be better in achieving performance gains. The ultimate goal of our cross-layer approach is to utilize the resource of one layer to another layer.

4. CLASSIFICATION

In this section, few existing proposals for cross layer design have been presented in terms of possible interaction among different layers. Classification is done on the basis of layers in which interaction is done:

1. No interaction
2. Two layer interaction
3. Three layer interaction
4. Four layer interaction

1. **No interaction:** It is the traditional approach. No interaction is done among layers. Solutions are developed for individual layers.

2. **Two layer interaction:** In this approach, interaction between two layers is done. Either it is physical to datalink, datalink to network, network to transport and vice versa.

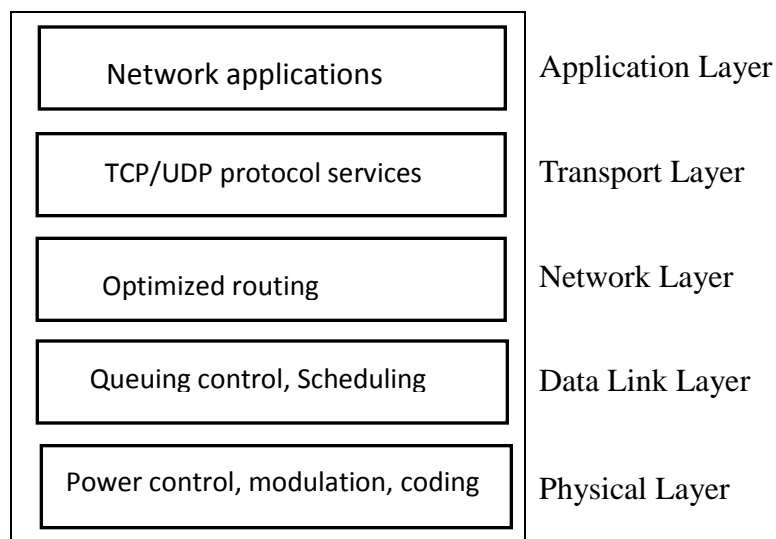


Fig. 1 Traditional protocol stack for WSN

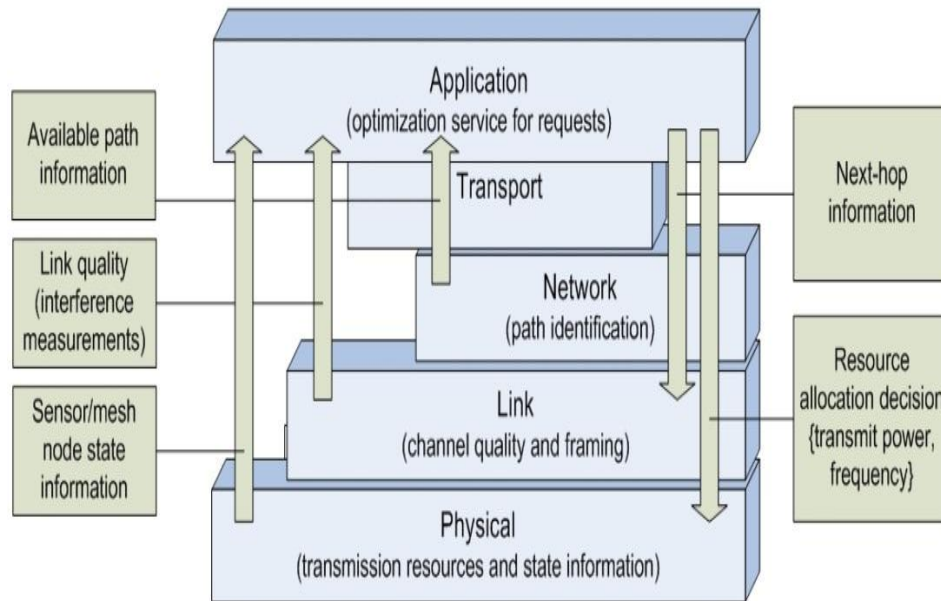


Fig. 2 Cross-Layer protocol stack for WSN

Authors in [3] considered two aspects, one is energy efficiency and the other is load balancing. Minimum energy path leads to energy efficiency but sensor nodes present in this path dies quickly and multiple suboptimal paths leads to load balancing among several sensor nodes but leads to higher consumption of energy. It takes in to consideration MAC and Network layer. MAC layer informs network layer about all the overhead communication of the neighboring nodes. It chooses next hop on the basis of less used ones in order to balance energy consumption. Authors implemented cross layer balancing routing (CLB) protocol and it is a bottom up approach. Network layer uses information given by the MAC layer for the choice of next hop. Mathematical modeling is done. This protocol avoids the network partitioning and enhances the network lifetime.

The paper[4] presented a cross layer approach and it includes MAC layer and the network layer. AODV protocol is used as a routing protocol with IEEE 802.11 protocol in MAC layer. They have made IEEE 802.11 MAC more energy efficient by using it with network layer. They try to improve the energy efficiency. The routing table is passed to the MAC layer from the network layer. Scheduling can be done more efficiently by using this approach.

3. Three layer interaction: In this approach, interaction between three layers is done. Parameters of one layer can be passed to the other two layers to save energy. In this paper[5], authors have considered the network, the MAC and the physical layers when transmitting the sensed data. The physical layer information i.e., closeness to the sink and energy level of each node is passed to the network layer. Then the network layer routes the data to the node that has the maximum energy and that is closest to the sink. Also, the protocol considered the MAC layer to determine the duty cycle of the node and extend the sleep time of node. This protocol is an advancement over CLEEP protocol. EECP protocol addresses many sources of energy wastage like idle listening, collision, overhearing and the energy cost of the routing path.

The paper[6] takes into account lifetime maximization problem under the constraint of end to end transmission success probability. It considers physical layer, MAC layer and Network layer. Network lifetime can be increased by combining the proposed algorithm at each layer. Features like Power control in physical layer, ARQ control in MAC layer and the routing protocol in network layer was taken into account and designed a cross layer strategy by considering them jointly. The GPA and GLPA algorithm are designed to minimize the energy consumption while CR and CRPC are used to increase the network lifetime.

4. Four layer interaction: In this approach, four layers of protocol stack is used. Parameters of any one or two layer can be used in another layer to preserve energy. Authors in [7] takes into consideration energy consumption and system throughput. The proposed model integrates four layers. They are application layer, network layer, MAC layer and physical layer. Node location is taken from application layer. Location is embedded after the route discovery process in the routing operation. This information is then utilized by the MAC layer transmission power control to adjust the transmission range. This model tries to minimize the neighbor discovery broadcasts to the active routes only. This model suffers from inefficient backup routing.

5. CONCLUSION

In this paper, we classify the cross layer approaches in terms of possible interaction between the layers. A lot of work has been done for two layer interaction. However, literature is inadequate for cross layer

interaction between three layers or more. There are many cross layer protocols which are energy efficient but still there is no standard benchmark protocol available. By referring the information presented in this paper, it is hoping that researchers will be inspired to develop new protocol for energy consumption. It has also been observed from the literature survey that physical and application layer is a largely unexplored area in wireless sensor networks.

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Sustainable Computing and System Development Life Cycle

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Abstract -This paper gives an insight of sustainable computing. The need for sustainable computing and the environmental risks associated if the practice of non green computing is followed. It also throws light on the health hazards posed by manufacturing to disposal of various hardware parts. And in the second part of paper it explains the need to change the System Development Life Cycle has been given. Various methods are devised by which we can find out energy efficiency and heat emission at every stage of development. Thus we change the conventional SDLC to Power Aware and Thermal Aware SDLC. Till now the software development process was client –specific but now it also needs to be environment-specific.

Keywords- *Green Computing; Power Aware Softwares; Optimization; e-waste;*

1. INTRODUCTION

Sustainable computing – once there was computing all over. The hardware and software were developed as per the requirements of the clients. The only aim was to reduce cost of the development and fulfill the needs. And the result was alarming for the environment. That was the time when the need arose to save the environment and the term green computing came into picture.

The ill-effect on environment is due to

- the raw materials involved in the manufacturing of hardware
- energy requirement of devices and software
- heat generated due to usage of the computer systems
- last but not the least – disposal of systems known as e- waste

Manufacturing of microchip involves fabrication consisting of following steps

Process	Description
Layering	Application of a thin layer of desired material, usually silicon or aluminum
Oxidation	Changes a semi-conducting silicon layer into a insulating silicon dioxide layer
Patterning	Carving of a dense, maze-like set of furrows into a layer
Etching	Use of solvents or particle bombardment to alter the layer patterns

Figure 1. Steps in manufacturing of microchips

And the other hardware devices along with the chips need to be dipped in solvents given further

Component	Fossil Fuels (kg)	Chemicals (kg)	Water (kg)
Computer Chips	94	7.1	310
Printed Circuit Boards	14	14	780
CRT monitors	31.5	0.49	450
LCD monitors	226	3.7	1290

Figure 2. Amount of chemicals required for various parts of computer system

Apart from this the manufacturing process involves soldering using lead. Many switches and batteries also make use of mercury. Both of these hazardous materials can cause serious health issues for the living beings. Secondly, the usage of computer systems requires a large amount of electricity. The systems consume energy even on standby mode. The energy requirement of softwares depends on complexity of software. More search operations, multiple sorting modules and unoptimized code makes the system power hungry. Apart from the usage of energy, the heat emitted by all electronic devices is equally affecting the environment which is one of the factors in increase in global warming. From past few years, household appliances with star ratings are available. Similarly computers and printers must follow the trend. One important aspect which gets neglected is that the cooling of all electronic devices itself is an energy consuming process and also aids in ozone layers depletion. The data centers and

servers across the world generate enormous amount of heat. Planning is being done for shifting of data centers to colder places like Siberia or underground places. This will eliminate the cooling requirement for them hence saving a lot of energy. In 1990's sleep mode in computers and printers was started so that if a system is lying idle for certain amount of time it will go to sleep mode thus saving energy and heat.

Following figure shows a picture of power consumption in watts at various stages of computer system.

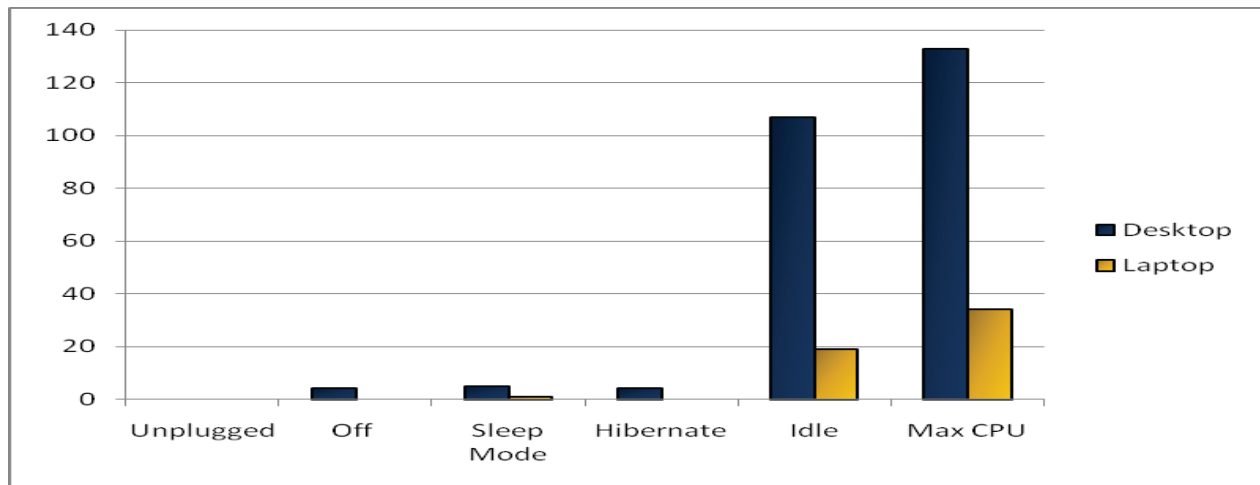


Figure 3. Power consumption of computer system

Centralisation of processing power by having thin clients is also another solution where servers will mainly generate heat and the terminals will be used only for display. This will reduce the multiplicity of processors and emissions. Cloud Computing and virtualization are also better alternative in this regard. While using internet one should use the search engine Blackle instead of google because it has a black background and text is in white colour. All electronic devices must be switched off if not being used. As even in standby mode it consumes power, so its best to unplug it. Using an LCD monitor then CRT monitor is advisable due to difference in their power consumption. Though keeping the brightness of display screens to an optimum level is big The next big issue to green computing is e-waste disposal . Thousands of tonnes of computers and electronic devices are dumped as waste every year across the world , termed as e-waste. Disposal of this e-waste is still into primitive stage causing risky health issues as it can not be disposed in water it will cause chemical reactions between various components and water thus risking the marine life. It also cannot be burnt as harmful gas emissions will take place

causing air pollution and various diseases. Landfill is another way of e-waste disposal. Instead of disposing the system, upgrading or getting it refurbished so that the old hardware can be reused is an initiative for green computing. Printouts should be taken only in emergency, for this the offices, travels, meetings agendas, reports, invitations etc. should be made paperless.

2. A DIFFERENT PERSPECTIVE AT SDLC

As the hardware part of the system is becoming green so should be the software part. When there is so much concern and awareness about global warming due to machinery so it will be obligatory to not ignore the heat generated due to software. Time has come that we have to give energy saving rating for the software. Time has come for development of star rated software. And to achieve this we need to thoroughly look at system development life cycle with a different perspective. Along with the software development we should be considering Power Aware System Development Life Cycle. We start with the first stage of SDLC which is the analysis stage. This stage deals with collecting the system requirements from the client and preparation of feasibility study report. As a part of sustainable computing, we should also gather power requirements for the system. Following points must be analysed –

- how many computer systems will be required ?
- how much will be the consumption of power by each computer on daily, weekly and annually ?
- how much heat will be produced by each system ?
- how many cooling equipments will be needed to compensate for the heat ?
- how much will be the power consumption of the cooling equipment itself ?
- what are the energy efficient options available in various hardware parts ?
- what will be the overall effect on the global atmosphere ?

Considering the above factors energy efficiency rating can be given.

In the second stage as designing of the system takes place in terms of system design, module design and database design. In a Power Aware System Development Life Cycle, the energy consumed at each module of the system should be checked. And thermal quotient can be assigned to each module based on their CPU usage, disk head movement, printing need and time consumed to complete the module. Following figure gives power aware system chart

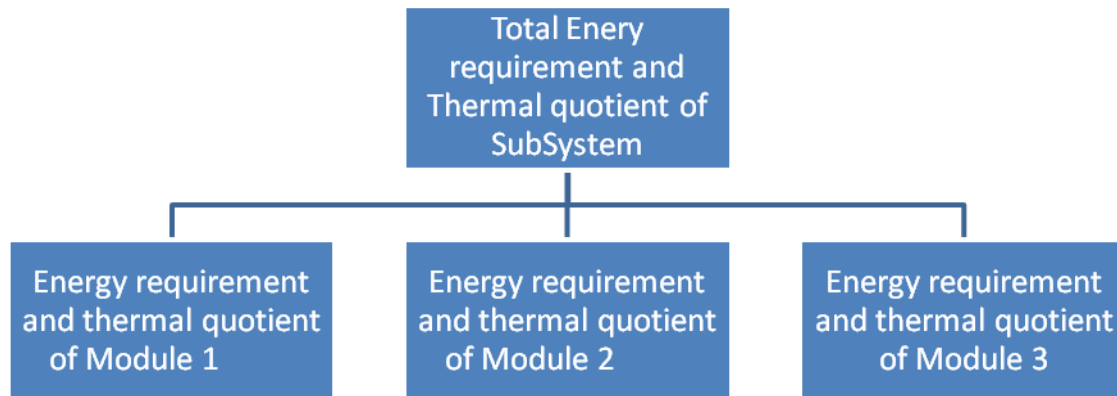


Figure 4. Subsystem power chart

Here, more the time consumed to finish the module, more will be the thermal quotient. By optimizing code, such modules can be replaced by more efficient ones. e.g. modules with preprocessed submodules or presorted databases will reduce CPU time and disk rotation and associated head movements. Code optimization should be done in following ways –

- remove unnecessary loops
- function calls should be reduced by in-line functions
- variable sized arrays or stacks should be used
- complexity of program also plays a crucial role
- many small but simplistic programs are better than one big complex logic
- concept of Function indexing can be used

Similarly, the choice of programming language should be such where precompiled functions are ample so as to reduce the processing time. Compilation time must be compared between 2-3 languages before finalizing one.

The database design should make use of proper normalization techniques which will result in lesser redundancy and faster access. Database indexing and better sorting and searching techniques is a must. Sorting and searching algorithms should be chosen as per the system because many a times it is situation based. The next stage to this is the stage of testing the system. This stage can give exact amount of energy requirement at module level and system level. This stage is a reality check and gives a

chance back to do any modifications required. At the end of this phase we can rate our software based on the previous hardware rating and tested system's performance. The next stage of implementation gives the real picture. We can compare the expected rating and actual rating of energy conservation. Here, we can come to know whether the software is a Green Software complying to GreenIT rules.

Further tools can be researched and developed for calculation of actual power consumption of software and ways to reduce it. The end result of which will be Green Earth .

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Graph Based Orange Computing Architecture for Cyber-Physical Being In Academic Libraries

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Abstract— In this paper a graph based orange computing architecture for cyber-physical Being (CPB) in Academic libraries' is proposed. The Physical world is not entirely predictable, thus Cyber Physical Systems (CPS) revitalize traditional computing with a contemporary real-world approach that can touch our day-to- day life. A graph is modeled to tackle the architectural optimization in a CPB's network. These frameworks of assisted method improve the quality of life for functionally locked in library professionals. A learning pattern is developed to facilitate wellbeing of the individual. Surveys were performed for multiple CPB's in academic libraries for different state, activities and quality of life scheme are considered.

Keywords: *Orange Computing, Cyber Physical System, Academic Libraries*

I INTRODUCTION

such as robotics, air-traffic control, automotive, healthcare, entertainment, defense, energy and other consumer applications. It has not been realized how the CPS is going to impact economy and social structure as vast major investment are being made worldwide in developing this technology. The economic and societal potential of such systems is vastly greater than what has been realized. The physical world, however, is not entirely predictable. So we have a wide area open in all area of research to explore and exploit the challenges and immense research opportunities in this Cyber-Physical System arena, and Cyber-Physical Being (CPB).

Cyber-Physical Systems (CPS) is rapidly emerging field, which will touch every aspects of life in

the near future. Semiconductor and Internet revolutionized and transformed our lives on how we interact with information and lead to the growth of information technology now we are into a new paradigm of CPS that would transform the way we interact with and manipulate the physical systems.

As CPS represents a bold new generation of systems that integrate computing and communication capabilities with the dynamics of physical Wireless and engineered systems.

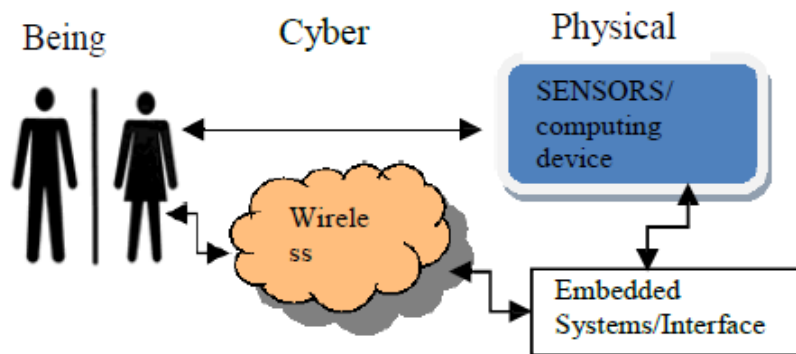


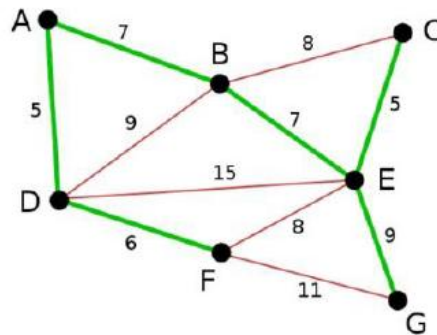
Figure 1. Basic framework of Cyber-Physical Being (CPB)

CPS is a revitalized version of traditional computing with a contemporary real-world approach. It integrates convergence of computing, communication, and storage capabilities that can monitor and/or control of entities in the physical world. Since CPS is still an immature field, its full potential can be conceived improving existing technology whether it is C++ like language-object orientation or multithreading behavior model or hiding abstraction layers in computing systems they all fail to express timing properties. The lack of timing in computing abstractions has been exploited heavily in such computer science disciplines as architecture, programming languages, operating systems, and networking. The physical world is concurrent, and our very survival depends on our ability to reason about physical dynamics. The problem is that we have chosen concurrent abstractions for software that do not even vaguely resemble the concurrency of the physical world, so when it comes to reliability and predictability of a system, it is expected that CPS implementation will not be an easy task in application Figure 1 brings out the framework of automation of cyber- physical system in cyber-physical being level to augment human interaction with complex systems that integrate across computational and physical world.

II. PROBLEM FORMULATION

There have been many combinatorial optimization problems be formulated on a graph where the possible solution be a directed acyclic graph or a spanning tree. The minimum spanning tree (MST) problem is one of these real time optimization problems that finds growing interest in both theoretical and practical aspects. A network or graph problem can be formulated as follows, undirected graph $G = (V, E, W)$ where V represents vertices, E represents edges and W represents weight. For example in telecommunication networks the goal is to provide service to terminal vertex of the network with minimum cost.

The figure 2 shows how a spanning tree of the given graph is constructed as a sub-graph and contains all the vertices together. When it comes to Machine to Machine (M2M) communication network such a spanning tree can yield a reasonable results[4-6]. But for an efficient optimization which include both cost and time consumption constraint we use a directed graph (DG).



A. Graph based Internet of Things (IoT) Modeling

The emerging internet of things (IoT) requires high level of interoperability and hardware-software usability where physical systems would interact with one another, which requires automatic capability and efficiency to accomplish linking resources and synchronization of event[17-20]. For example figure 3 contains 10 elements which are interconnected. If node 1 has sensor, it updates its data as it receives newly sensed information, then the data is communicated to another node say node 9, and a event from node 3 triggers node 9 to forward the data to node 5 which is a destination node.

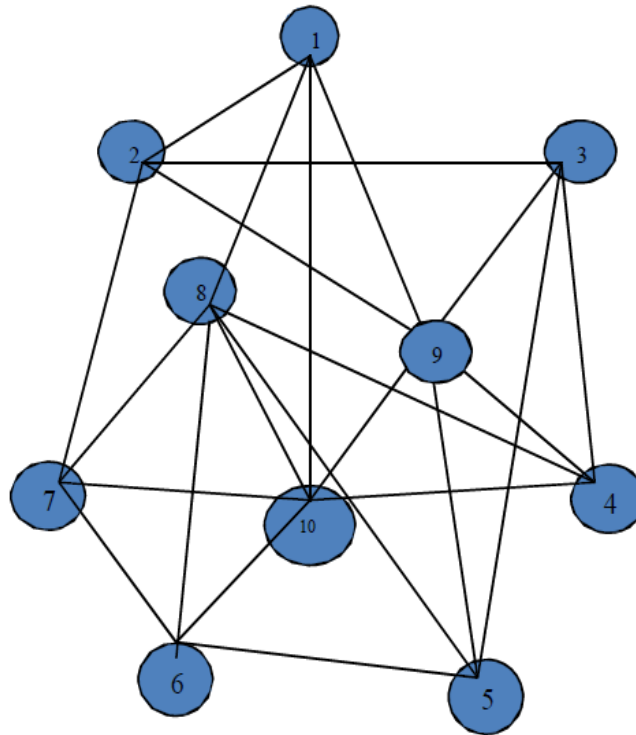


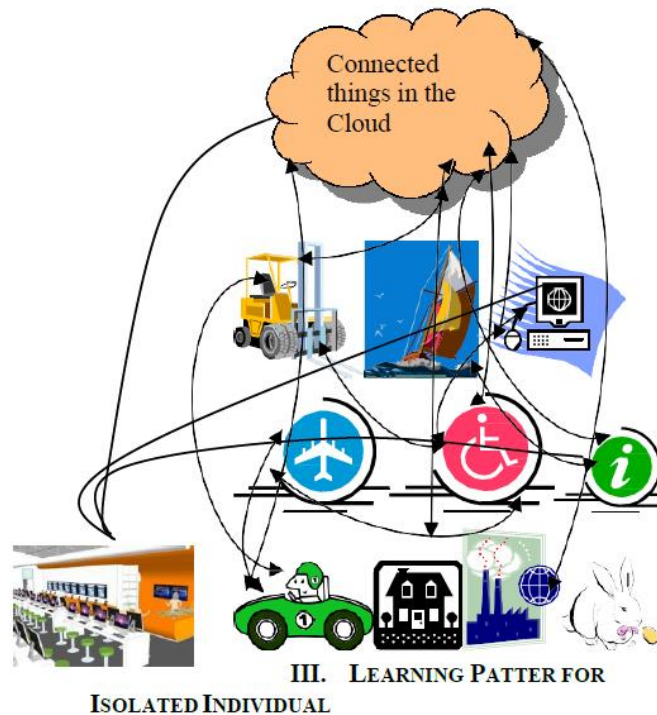
Figure 3. Connected things with in a network

Connected M2M and an IoT Scenario

As computers become ever-faster and communication bandwidth ever-cheaper, computing and communication capabilities will be embedded in all types of objects and structures in the physical environment. Application with enormous societal impact and economic benefit will be created by harnessing these capabilities in time and across space, thus Cyber-Physical Systems (CPS) are physical and engineered systems whose operations are monitored, coordinated, and controlled and integrated by a computing and communication core. This intimate coupling between the cyber and physical will be manifested from the nano-world to large scale wide-area systems of systems. Yes cyber-physical systems will transform how we interact with the physical world just like the internet transformed how we interact with one another.

But internet on the other hand surpassing its primary function to communicate data and connecting people worldwide to an entity that brings all things together and inter-connects them. As more and more devices are arriving embedded with sensors and the ability to communicate we are moving towards an automated

future, thus we move from internet of people to internet of things paradigm[7-9]. Conventional internet includes a server and routers and so on, but they miss the important factor people out of that conventional communication, as humans are imperfect we have limitation to remember things, save information, save data or even pay full attention or accurately calculate. This proves that fact that we are good for nothing in acquiring data from the real world. On the other hand if we have computing machine that has all the information , they gather data from various sensors and computing accordingly and send



A. General Learning Method

A general model for locked individual management learning agent is shown in figure 5, the accumulation of experience that guides the behavior (action policy) is represented by a cost estimator whose parameters are learned as new experiences are presented to the agent.

The agent is also equipped with sensors that define how observations about the external process are made. These observations may be if necessary combined with past observations or input to a state estimator, defining an information vector or internal state which represents the agent's belief about the real state of

the process The cost estimator then maps these internal states and presented reinforcements to associated costs, which are basically expectations about how good or bad these states are, given the experience obtained so far. Finally, these costs guide the action policy. The built-in knowledge may affect the behavior of the agent either directly, altering the action policy or indirectly, influencing the cost estimator or sensors.

The experience accumulation and action taking process is represented by the following sequence. At a certain instant of time, the agent:

1. Makes an observation and perceives any reinforcement signal provided by the Process.
2. Takes an action based on the former experience associated with the current observation and reinforcement.
3. Makes a new observation and updates its cumulated experience.

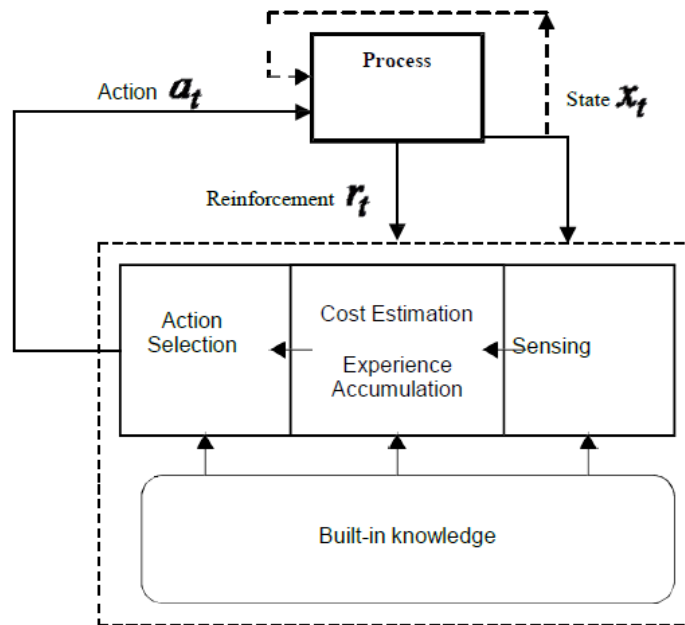


Figure 5 A general model of the learning agent

B. Intelligent DPM Model

In this section, Intelligent Individual management (IIM) designed using reinforcement learning agent method which is given in fig 6. This agent learning to predict the best by reinforcement learning method

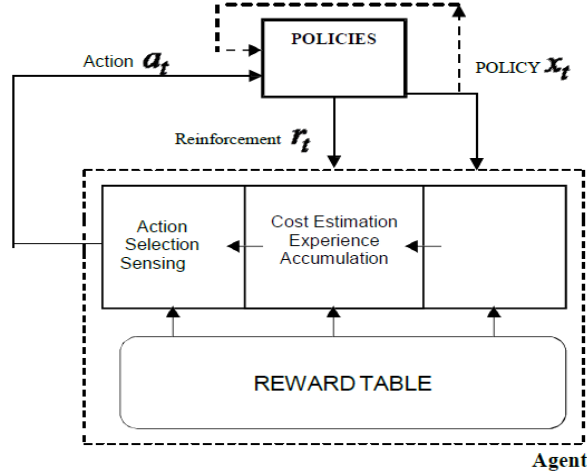


Figure 6. An IDPM model of the learning agent

C. The Reinforcement Condition of IDPM

The basic assumption of Markov Decision Processes is the Markov condition: any observation made by the agent must be a function only of its last observation from the state transition and action on select the best policy and change the control to the best (plus some random disturbance)

$o_{t+1} = f(o_t, a_t, w_t)$ Where o_t is the observation at time t , a_t is the action taken to predict best policy and w_t is the reward weight. o_t Provides complete information about x_t . This is equivalent to perfect observability of best policy, Of particular interest is the discounted infinite horizon formulation of the Markov Decision Process problem. Given

- A finite set of possible actions $a \in A$,
- A finite set of policies $x \in X$,
- A finite set of bounded reinforcements (payoffs $r(x, a) \in \mathbb{R}$;

The agent gives the reward to which policy minimizes the power consumption. The condition of policies for getting the reward is power saving p_{save} in sleep time should be more than the sum of power consumption at wake up time p_{wake} and power consumption of idle time p_{idle} of embedded system.

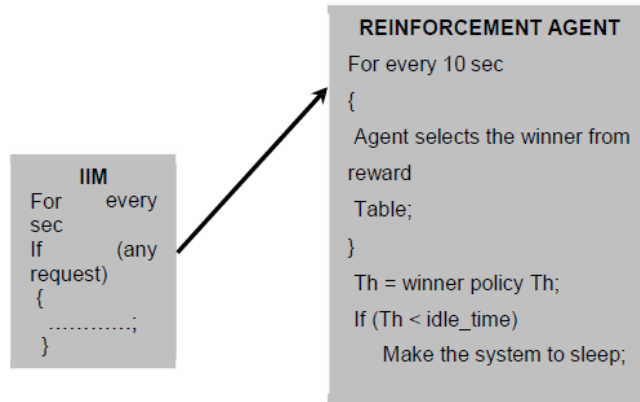
$$T_{th-sleep} \times p_{save} \geq T_{wake} \times p_{wake} + T_{idle} \times p_{idle}$$

To get reward, the policy should make the embedded device to sleep state until the above condition is satisfied. So the threshold time T_{th_sleep} is

$$T_{th_sleep} \geq \frac{T_{wake} \times P_{wake} + T_{idle} \times P_{idle}}{P_{save}}$$

To get reward, the policy should make the system idle state, above or equal to the threshold time T_{th_sleep} .

The pseudo code for the IIM given below



IV. SURVEY RESULTS

A survey was conducted based on learning methods pattern [14] have either under prediction or over prediction by which they pay performance or quality improvement of a functionally locked in individual. Our policy makes sure that server is ON, when there is an event in the Service Requester and Service Queue. Which means that under prediction or over prediction will never occur. Performance penalty will never occur by the proposed scheme.

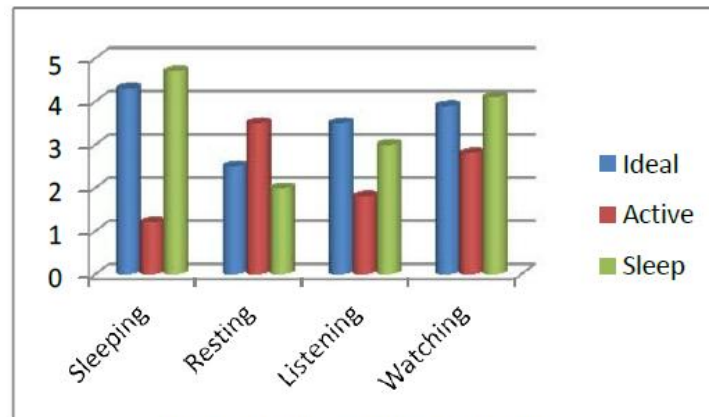


Figure 7. Activity measurement of a CPB

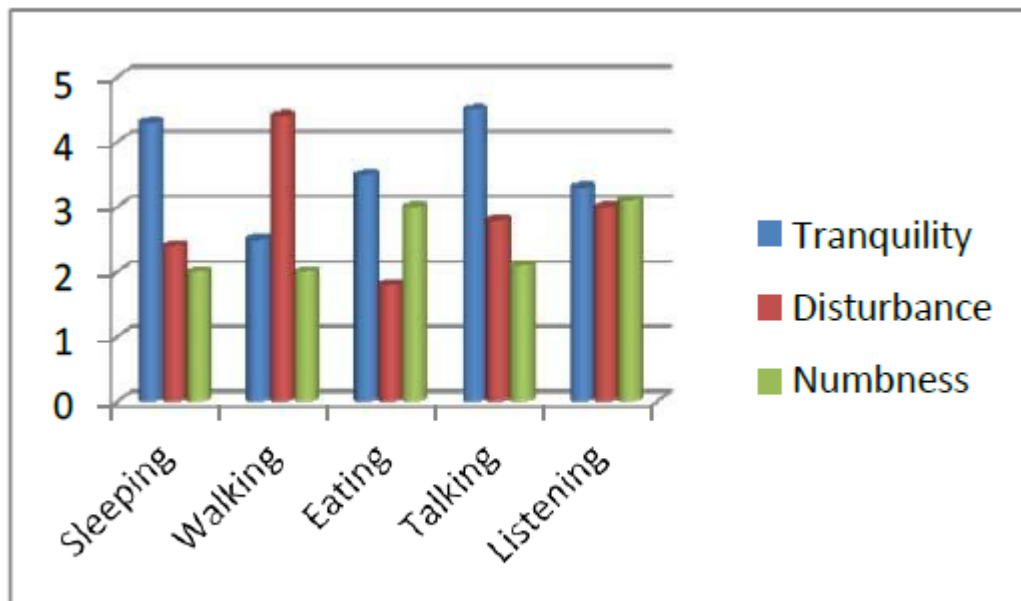


Figure 8. A Measure of quality of life of a CPB

V. CONCLUSIONS

A graph based orange computing architecture with multiple CPB for a CPS in academic libraries is proposed in this paper which uses a directed graph (DAG) to represent the whole environment. Parallel M2M establish communication within the network and are partitioned and reconfigured dynamically for large scale network such as IoT is also presented.

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Green Computing: Need of Today

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ABSTRACT

The Green computing environment is new era technology. The Green Computing is the study and practice of well-organized and environment friendly computerized resources. The objective of the paper is to deal with basic information about the Green computing. The Need of Green Computing and to mention the various way we may use for green computing.

Keywords: Green computing, environment, computers, hazardous, ICT

I INTRODUCTION

The definition of Green Computing is not just limited to save the energy, it is also getting knowledge of designing and engineering a proper process as well as computing devices in a way that reduces their harmful environmental force. Major ICT manufacturers are constantly doing research in energy efficient computing devices and trying to invent the use of hazardous waste supplies in order to encourage the recycling of digital devices. Green computing is currently becoming a research issue and research scholars are focusing to do invention and better opportunities on various dimensions related to this area. The focus of researcher is to study how the Green computing is getting implemented by the efficient and eco-friendly computing resources and how the green computing is under the attention of environmental organizations and businesses industries.

The world have come to realize that going green is the best practice, both in terms of environment and in optimal costs. The assurance to reduce environmental impact and power consumption are becoming more and more important objectives for organizations and architecture leaders are now proactively considering environmental resource constraints along with more traditional IT business goals. The main objective of this technology is to maximizing the energy efficiency and to promote biodegradability. The industry continues to drive effectiveness into the IT infrastructure, environmental complete quality

metrics to be built into at every point of the IT architectural process, and a continuing architectural assurance is required at all levels of the infrastructure, further than a representative product procurement strategy. Green initiatives at this time has been raised concerning these issues and presents a report of study to become skilled at more about the future of green computing.

The concept of green computing was started in year 1992 after launch of United States Environmental Protection Agency program which was initiated to promote and design energy efficient devices. The concept implemented by them was got popular and used worldwide as a sleep mode of devices. The Green Computing basically focused to minimize the wastage and hazardous material generated by industries and the harmful impact of technologies used worldwide. Green computing is a need of secure environment. Its goal is to provide secure and safer use of natural resources to fulfill the needs of society without damaging or depleting it.

A well defined definition of Green computing is to create an environment which is carbon neutral and with optimum and efficient use of technical devices. San Murugesan defines the field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated peripheral devices and networking communications systems with more efficiently and effectively or no bad impact on the environment." [10]

II NEED OF GREEN COMPUTING

The growth of technology is making causes to find cleaner and more reliable energy sources which are affordable and promoting sustainable growth. The objective of environment friendly devices has become major preoccupations of countries. The issue of green environment is not limited to the boundary of country but it's open challenge to the world. To this end, all private and governments sectors promptly supporting research, and cultivating innovation to nurture the new technologies in all aspects of growth and production. Its more over focusing to encourage "Green Technology" market and uptake of these technologies through consumer.

The use of computer is increasing day by day because of the use of those technology is saving our lot of time as well as less human effort is needed. This makes our life easier in comparison to traditional

approaches what we are using in day to day life. Most of the users are not aware that the use of computer, networking or peripheral devices are emitting heats and green house gases if not supported by proper cooling system. The Data Centers are consuming a lot of energy and emitting the harmful gases, in result making the environment polluted.

The survey done in last decades promptly speaking about the damages of environment and its impact openly coming in front of us in form of natural disasters. The reason of this pollution is not only the emission of gases but also the materials used for manufacturing the devices. We can categorize the issues based on the form through which the Green computing is becoming need of today. The following are the categories -

- a. Hardware Prospective
- b. Generation of Heat
- c. Hazardous waste materials
- d. Impact of Chemical Phenomena

Hardware prospective - The devices used for Technological concepts are basically electromagnetic devices. It is possible that the hardware used for technical up gradation will create problem during the life span by omitting harmful gases, heats etc but also sometime after the expiry it may become major issue because of its parts which are not biodegradable and rarely recyclable. Improper decomposition of pieces of those devices are also the reason of pollution and harmful for natural resources.

Generation of Heat - Generation of heat is again one of the countable issue of electronic devices. Most of the electric devices generate a lot of heat and causes emission of CO₂. The CO₂ is responsible for greenhouse effect. If the CO₂ ratio is increasing its probably promoting the global warming effect. The extra ratio of CO₂ causes more heat to be trapped by the atmosphere, causing the planet to become warmer rather than being in its natural warming temperature. The increase in global temperature ultimately is called global warming. In result the global warming increases and causes the anthropogenic climatic changes.

Hazardous Waste Materials- As per the report published in Population Reference Bureau on April 2013 around 40 million metric tons of e-waste are produced every year and only 13% of this weight is recycled in developing countries. Out of this 22.5% tons of this waste produced by the European Union(as per UNEP report). [13] Every year almost 15% of disposed materials are Hazardous e-waste.[14]

Impact of Chemical Phenomena - Most of the device pieces are not degradable and becomes a hazardous at the time of decomposition and releases harmful elements like lead, mercury cadmium etc into air. During the manufacturing of devices toxic chemicals are used to make them insulator, conductor non-conductor and fire safer etc. while decomposition of this devices exposes chemical fumes which in long term creates a big health issues like cause and other maternity problem. As per UNEP report of 2013 India manages to handle around 70% of e-waste. It is assumed that from 2007 to 2020 following will be the ratio for e waste -

- | | |
|---------------------------------------|----------------------------------|
| • mobile e-waste | - increased up to eighteen times |
| • Domestic Electronic devices e-waste | - increased up to two times |
| • computer e-waste | - increased up to five times |

WAYS OF GREEN COMPUTING

The green computing is not just limited to the group of manufacturer to make energy efficient devices but a simple effort of a general person may also support the green computing.

- Proper use of electric devices
- Use of energy efficient products
- Switching off the devices when they are not in use
- Sending devices in sleep mode if they are not in active mode
- Avoiding unmanaged use of applications in devices and optimum power plan
- The use of LCD is the less power consumption device then CRT .
- Use of hardware at its full life span
- Avoid usage of un needed gazettes
- Support proper recycling and decomposition of gazettes
- E-cycle used computer equipment.

- Buy "Energy Star" labeled monitors, desktops, laptops, and printers .

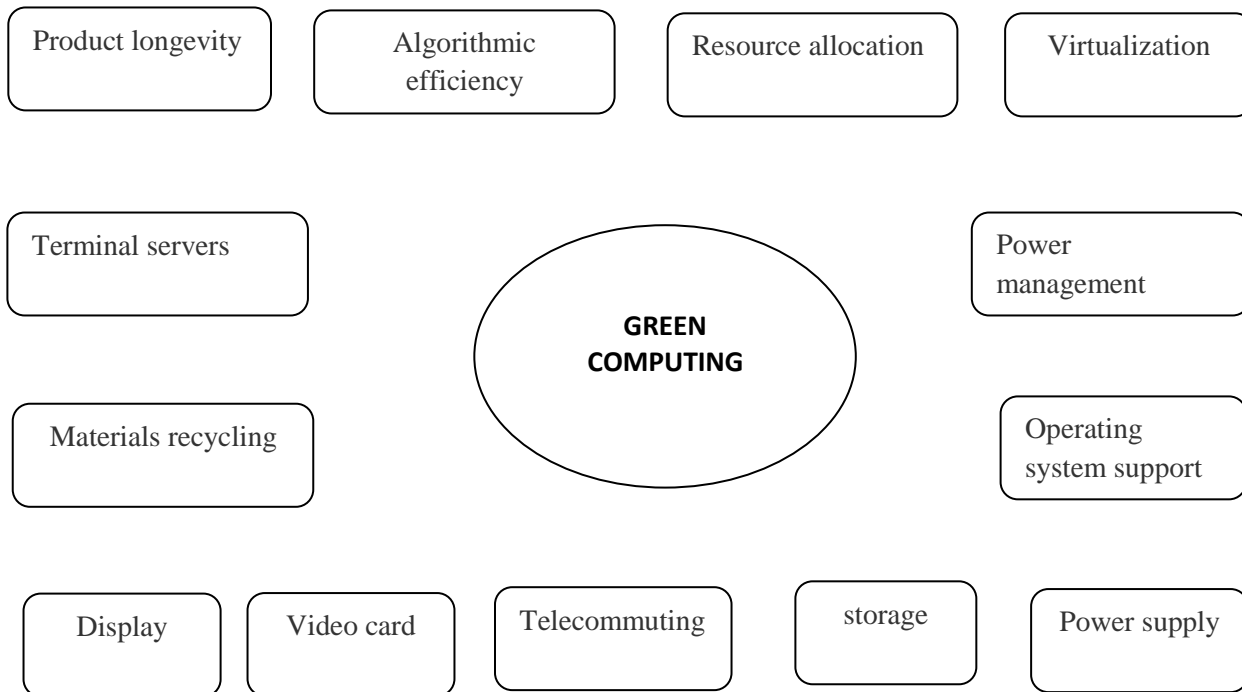


Figure 1 - Green Computing Approaches through manufacturing of energy efficient device [9]

The figure shows the specific methods for green computing environment[9]. By doing better planning for resource utilization we can not only save energy but also may increase the life span of devices. The plan should be made more precisely to save the energy and better and optimum utilization of resources. The methods shown below are the methods which may be used to create energy efficient devices.

CONCLUSION

Green computing represents a responsible way to address the issue of global warming. Adopting green computing practices is a positive step of business Entrepreneur to save the environment and reducing

the paper cost and energy. This research paper is the small contribution to understand the importance of Green Computing. The role of common person to save the environment and its natural resources. The steps should be taken for the green computing environment to stop spreading pollution. The focus is to be use of technology in efficiently without harming the natural resources. The worldwide different organization are already started adopting and supporting the green computing. The government of different countries are passing budgets and focusing on proper use of ICT.

Not only Government but some non-governmental environmental organizations emphasizing and working to removed retardants from electronic products. The challenge is not only limited to improve the design of electronic devices to support green computing but also adding business values over a time and to understand what exactly is the current market demand and making sustainable changes . For a business organization , the green computing is a challenge to balance the needs of various stakeholder who have ideas to manage the changes. Providing the substitute replacement shall be tested for lower results than the original material to ensure the impacts to health and at environment .

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