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Energy-Efficient for Distributed Wireless Data Transmission in Mobile-Cloud Computing

C.T.K. Amarnath, S.K. Mahendran

Abstract: ***In Mobile cloud computing, Energy Efficiency is the Key factors to perform every task with less Energy. The Smart phone users are increasing day by day the data transfer speed is also increase and the energy consumption is also increase. In this paper to maintain the energy efficient for distributed wireless data transmission in Mobile cloud computing is called Distributed Wireless Data Transmission (DWDT). By this method, energy efficient is to be handled by using best intermediate path of data transmission in Mobile Cloud Computing with Energy Efficient. With this methodology the mobile cloud services can be reliability and energy efficiency in wireless data transmission in mobile cloud environment.***

Index terms: Energy-Efficient, Distributed, Data Transmission, and Mobile Cloud Computing, Distributed Wireless Data Transmission

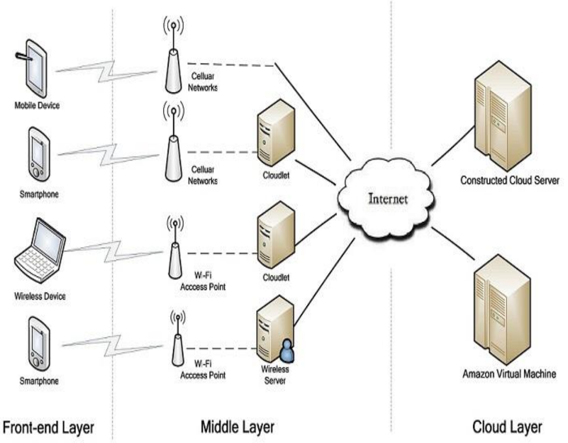
I. INTRODUCTION

1.1 Mobile Cloud Computing

Mobile Cloud Computing (MCC) is a type of communication service in which processing input data and storage of processed data occur in a place apart from mobile device. The ultimate aim of MCC is to enhance the business infrastructure and capabilities of mobile network operators and cloud service providers. The Mobile Cloud Computing is to facilitate functioning of all mobile applications on mobile devices itself. Mobile cloud computing provide many business opportunities at lower cost with a lot of benefits. There are various cloud service available such as Amazon Web Services. Infrastructure as a service and Platform as a service are the services provided by cloud service providers such as amazon web services. Subjects such as mobile cloud computing, Distributed Computing were also included in computer and Information sciences. In addition to the above, research groups also work on possible innovations on protocols, operating environment, design of program and set of rules for Mobile Cloud Computing and distributed computing. The research group has established algorithms, tools, and technologies which approach productive energy, resilient, upgradable, sturdy and high throughput on mobile devices. In present scenario, the mobile cloud computing in addition with communication networks paves a path way for various experiments such as Mobile Computation Offloading, Connectivity, WAN Unconsciousness, Mobility Administration, Context-Processing, Restriction of Energy, Vendor/data Lock-in, Privacy and Security, Elasticity that delay MCC achievement and implementation.

1.2 ARCHITECTURE

MCC is the combination of resource-constraint mobile devices cloud computing, this will provides full access to all resources through the cloud "Anytime, Anywhere, Anyhow" (Fig.1). Mobile Cloud Computing, which is basically the use of Cloud Computing technology on a mobile device.



The innovations in Mobile cloud computing builds a platform for mobile devices and cloud computing to form a infrastructure, whereby cloud computing performs the lifting of computing-demanding tasks and storing huge amounts of data. In this MCC new architecture, data processing and data storage happen outside of mobile devices.

The Advantages of this IT architecture to generate Mobile applications:

- Enhanced battery life
- Increase in processing and data storage capacity
- Enhanced management of data due to storage and processing speed.
- Enhanced consistency and expandable
- Simplicity of integration

Advantages of MCC to the Users:

- **Rapid Development:**

Cloud companies developing mobile applications in favour of mobile phones.to meet the latency and speed by various optimizing algorithms. Researches and application program developers are also taking care of the scalable option for future extension of innovations in this regard. These applications come up the potential of both designers and apps..

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* Correspondence Author
C.T.K. Amarnath*, Research Scholar, Department of Computer Science, Bharathiar University, Coimbatore, Tamilnadu.
Dr. S.K. Mahendran, Assistant Professor & HOD, Department of Computer Science, Government Arts College, Udhagamandalam, Tamilnadu.

- **Flexible**
Mobile applications are built of adaptable and expansive means. While developing the application, the requirement of customer should also be taken into account in line with the platform of mobile cloud computing.
- **Secure**
To keep the data secure in cloud the mobile cloud computing system is designed with reliable and redundant hardware and software. The confidentiality, availability and Integrity of data is required to be strictly adhered to protect the data as vital data were backed up and get back as per utility in a secured manner.

II. RELATED WORK

The Data Transmission network having A nodes is pictured by a graph G=(A,B) where A express the distance of node A = (a_1, a_2 ,...a_n) were the set of nodes. Consider r as the transmission range of data a_i and the node a_j is within the transmission limits of data ai and node ai is confined within transmission limits if the extent between (a_i , a_j) = r and edge d_{ij} = (a_i , a_j) ϵ A_s . $C_{i,j}$ is the cost of direct edge d_{ij} and E represents the minimum data transfer from a_i to the destination. The undermentioned speculations are contemplated: (i) Energy will be saved while there will be no data traffic and mobile node gets into sleep or power down mode. (ii) All nodes are free in the of time data transmission in mobile cloud computing. (iii) All links between nodes are direct and easily transfer the data is given.

III. SYSTEM MODEL AND PROBLEM FORMULATION

3.1 EXISTING SYSTEM

The mobile computing Technology and cloud computing prospects are combined together to form mobile cloud computing and the same is being implied on mobile devices to run various applications. There are various applications and area of mobile computing. In mobile devices, energy scarcity is a major problem and hence energy efficient data transmission is an acute problem. The issues of consideration are data transmission set up for delay tolerance, energy saving link selection and data concerted application in mobile cloud computing. First of all the problem is taken as a separate time stochastic dynamic application program that schedules to enhance the energy utilisation and system productiveness. To conclude the solution for the framed SDP, we have chosen a Distributed Wireless Data Transmission algorithm that does not depend on statistics of estranged speculative information. The present studies revealed that the proposed algorithm could minimise the mean energy utilisation for transporting a packet by a highest of over sixty percent in comparison to other possible minimum-delay and SALSA policies.

Disadvantages

- High delay
- Inefficient result

3.2 PROPOSED ALGORITHM

In the proposed system, the energy efficiency and finding the best intermediate path to transfer the data in the destination is called Distributed Wireless Data Transmission (DWDT). In processing, a replica of computing device could be made by virtual machines. Virtual machines behave like original computers with same architecture and render the same functionality of a computer. It includes specialized hardware, software, or a combination of all. Virtual machines are collaborated for cloud servers. The assigned memory, limit, bandwidth and the time limit for downloading the files from the cloud are predefined for virtual machines. For downloading files and to access any information from cloud, a secret key is created from the cloud in a very secure manner. The user is required to registers their particulars and details for accessing and downloading files from the cloud.

IV. METHODOLOGY

To increase the energy efficiency and finding the best intermediate path to transfer the data to destination.

DWDT runs in $O(|X|.|Y|)$ time, where $|X|$ and $|Y|$ are the number of vertices and edges respectively.

```
Function DWDT(list vertices, list edges, vertex source)
  distance [],predecessor[]

    /* In implementation part, The graph represented as
     lists of vertices and edges, and fills two arrays
    (distance and predecessor) about the shortest path
    from the source to each vertex */

    // 1. Initializing Graph
          p is the predecessor
          d is the distance
          for each vertex x in vertices
          d[x] = inf          // to Initialize the distance to all
          vertices to infinity
          p[x] = null    // A null predecessor
          d[source] = 0

    // 2. Finding Edges repeatedly
           for n from 1 to size(vertices)-1
           for each edge (e, z) with weight z in edges
            if d[e] + z < d[x]
          d[x] = d[e] + z
          p[x] = e
  // 3. Checking negative-weight cycle graph
           for each edge (e, z) with weight z in edges
            if d[e] + z < d[x]
            error "A negative-weight cycle graph "
 return d[], p[]
```

In second part, let a shortest path *D* from the *source* to *e* with at most *n* edges. Consider z be the intermediate vertex before *e* on this path. Then, the part of the path from *source* to x is a strictly shortest path from *source* to x with at most *n-1* edges, since if it were not, then there must be some shorter path from *source* to x with at most *n-1* edges, and we could append the edge *ex* to this path to obtain a path with at most *n* edges that is strictly shorter than *D*—a contradiction.

By inductive assumption, x.d after $n-1$ iterations is at most the length of this path from *source* to x. Therefore, ex.weight + x.d are at most the length of *D*. In the n^{th} iteration, e.d gets compared with ex.weight + x.distance, and is set equal to it if ex.weight + x.d is smaller. Therefore, after *n-1* iterations, e.d is the most length of *D*, i.e., the length of the shortest path from *source* to *e* that uses at most *n* edges.

$$x[n].distance \leq x[n-1(mod\ \mathrm{j})].distance + x[n-1(mod\ \mathrm{j})]x[n].weight$$

Around the Sum of cycle, the x[*n*].distance and x [*n*−1 (mod j)].distance terms cancel, leaving

$$0 \leq sum\ from\ 1\ to\ \mathrm{j}\ of\ x[n-1\ (mod)]x[n].weight.$$

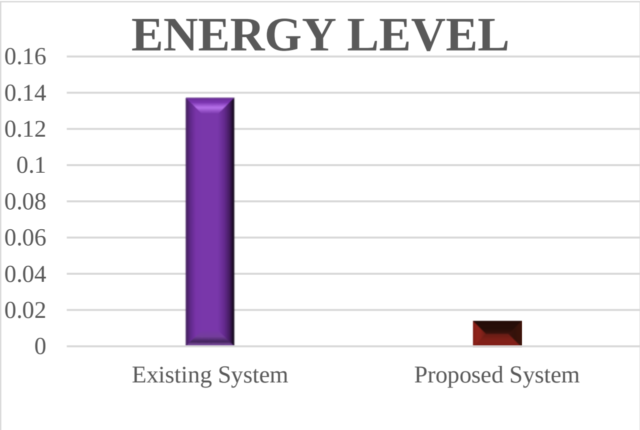
V. RESULTS WITH CONVERSATION

The performance of Distributed Wireless Data Transmission (DWDT) is finding out by the simulation results, it is observed by the transmission data rate.

ACCURACY OF DATA TRANSMISSION

Sending File Size KB	Data Rate @ Millisecond	Accuracy
2467	879	99.91
3556	983	99.84
5789	1144	99.93
7903	1352	99.78
9223	1492	99.72

VI. PERFORMANCES ANALYSIS



In the existing system, the energy level is calculated based on the ramp energy, transfer energy (uploading and downloading data) and the maintenance energy.

$$E_t = E_{ramp} + \sum_i E_i + E_{Tail} + E_{main}$$

In the existing system, the total energy required for transmitting the data is 0.137J/bit.

In the proposed system, energy expenditure for transferring and receiving information/data of the mobile client are both 0.0142 J/bit. The ingress and egress information/data sizes of each assignment are considered to be homogeneous. The transmission energy of each assignment is identical to the size of each problem / transfer rate.

VI. CONCLUSIONS

It is concluded that the mobile cloud computing plays an important role in transferring of data between the users. The user can upload the files in the cloud server using the VM. We have proposed a Distributed Wireless Data Transmission algorithm called DWDT to arrive at a solution for this optimization problem, which works with dynamic programming and randomization. It also fetch the concepts of hamming distance as a Transmission criterion. Simulation results envisaged that the proposed DWDT algorithm can have the ability to find good optimal solutions and it could handle complex issues and problems without discharging its computational efficiency. The DWDT algorithm can be used dynamically, to comply with the changes in the network transmission rate. The simulation results will tend to offload as many assignments as possible when the network efficiency is good, resulting in existing scheme in these segments to a near optimal solution with a very fast execution time.

REFERENCES

1. http://www.mobilecloudcomputingforum.com
2. Jordan Cohen, Embedded speech recognition applications in mobile phones:. Status, trends, and challenges, 2008 IEEE International Conference on Acoustics, Speech and Signal Processing, Las Vegas, NV, 2008, pp. 5352-5355.
3. Tolga Soyata ; Rajani Muraleedharan ; Colin Funai ; Minseok Kwon, Wendi Heinzelman, Cloud-Vision:. Real-time face recognition using a mobile-cloudlet-cloud acceleration architecture, 2012 IEEE Symposium on Computers and Communications (ISCC), Cappadocia, 2012, PP. 59-66.
4. Sanja Cvijić ; Marija D. Ilić, Part I:. A New Framework for Modeling and Tracing of Bilateral Transactions and the Corresponding Loop Flows in Multi-Control Area Power Networks, in IEEE Transactions on Power Systems, vol. 29, no. 6, pp. 2706-2714, Nov. 2014.
5. Mahmoud A. Allam, Amr A. Hamad, Mehrdad Kazerani, Ehab F. El-Saadany, A Novel Dynamic Power Routing Scheme to Maximize Loadability of Islanded Hybrid AC/DC Microgrids Under Unbalanced AC Loading, in IEEE Transactions on Smart Grid, vol. 9, no. 6, pp. 5798-5809, Nov. 2018.
6. http://standards.ieee.org/getieee802/download/ 802.11-2012.pdf."
7. Vinod Namboodiri and Lixin Gao, Energy-Efficient VoIP over Wireless LANs, IEEE Transactions on Mobile Computing, vol. 9, Issue 4, pp. 566 – 58, 2010.
8. Yu-Chee Tseng, Chih-Shun Hsu and Ten-Yueng Hsieh, Power-saving protocols for IEEE 802.11-based multi-hop ad hoc networks, Twenty- First Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM 2002, vol.1 ,pp. 200 – 209, 2002.
9. Hassen A. Mogaibel ; Mohamed Othman, Review of Routing Protocols and It's Metrics for Wireless Mesh Networks, 2009 International Association of Computer Science and Information Technology - Spring Conference, Singapore, 2009, pp. 62-70.
10. Walid Bechkit, Mouloud Koudil, Yacine Challal, Abdelmadjid Bouabdallah, Brahim Souici, Karima Benatchba, A new weighted shortest path tree for convergecast traffic routing in WSN, 2012 IEEE Symposium on Computers and Communications (ISCC), Cappadocia, 2012, pp. 000187-000192.
11. Woonsik Lee, Minh Viet Nguyen, Arabinda Verma, Hwang Soo Lee, Schedule unifying algorithm extending network lifetime in S-MAC-based wireless sensor networks, in IEEE Transactions on Wireless Communications, vol. 8, no. 9, pp. 4375-4379, September 2009.
12. Winnie Louis Lee, Amitava Datta, Rachel Cardell-Oliver, FlexiTP: A Flexible-Schedule-Based TDMA Protocol for Fault-Tolerant and Energy-Efficient Wireless Sensor Networks, in IEEE Transactions on Parallel and Distributed Systems, vol. 19, no. 6, pp. 851-864, June 2008.

13. Jianping Wang, Deying Li, Guoliang Xing, Hongwei Du, Cross-Layer Sleep Scheduling Design in Service-Oriented Wireless Sensor Networks, in IEEE Transactions on Mobile Computing, vol. 9, no. 11, pp. 1622-1633, Nov. 2010.
14. Feng Liu, Chi-Ying Tsui, Ying Jun Zhang, Joint Routing and Sleep Scheduling for Lifetime Maximization of Wireless Sensor Networks, in IEEE Transactions on Wireless Communications, vol. 9, no. 7, pp. 2258-2267, July 2010.
15. Yanwei Wu, Xiang-Yang Li, YunHao Li, Wei Lou, Energy-Efficient Wake-Up Scheduling for Data Collection and Aggregation," in IEEE Transactions on Parallel and Distributed Systems, vol. 21, no. 2, pp. 275-287, Feb. 2010.
16. Chi-Tsun Cheng, Chi K. Tse, Francis C. M. Lau, An Energy-Aware Scheduling Scheme for Wireless Sensor Networks, in IEEE Transactions on Vehicular Technology, vol. 59, no. 7, pp. 3427-3444, Sept. 2010.
17. S. Zairi, B. Zouari, E. Niel, E. Dumitrescu, Nodes self-scheduling approach for maximising wireless sensor network lifetime based on remaining energy, in IET Wireless Sensor Systems, vol. 2, no. 1, pp. 52-62, March 2012.
18. Sambit Kumar Mishra, Deepak Puthal, Bibhudatta Sahoo, Suraj Sharma, Zhi Xue, Albert Y. Zomaya, Energy-Efficient Deployment of Edge Dataenters for Mobile Clouds in Sustainable IoT, in IEEE Access, vol. 6, pp. 56587-56597, 2018.
19. Bo Jiang, Binoy Ravindran, Hyeonjoong Cho, Probability-Based Prediction and Sleep Scheduling for Energy-Efficient Target Tracking in Sensor Networks, in IEEE Transactions on Mobile Computing, vol. 12, no. 4, pp. 735-747, April 2013.
20. Chunsheng Zhu, Laurence T. Yang, Lei Shu, Victor C. M. Leung, Joel J. P. C. Rodrigues, Lei Wang, Sleep Scheduling for Geographic Routing in Duty-Cycled Mobile Sensor Networks, in IEEE Transactions on Industrial Electronics, vol. 61, no. 11, pp. 6346-6355, Nov. 2014.
21. Junchao Ma, Wei Lou, Xiang-Yang Li, Contiguous Link Scheduling for Data Aggregation in Wireless Sensor Networks, in IEEE Transactions on Parallel and Distributed Systems, vol. 25, no. 7, pp. 1691-1701, July 2014.

AUTHORS PROFILE

C.T.K. Amarnath, is a Research Scholar in the Department of Computer Science, Bharathiar University, Coimbatore, Tamil Nadu, India. His Research interests lies in the area of Cloud Computing.

Dr. S.K. Mahendran, is working as Assistant Professor & HOD in Department of Computer science, Government Arts College, Udhagamandalam-2, Tamilnadu. Educational Qualification: MCA, MPhil(CS), Ph.D. holder in Computer Science from Bharathiar University. He has nearly twenty seven years of teaching experience and guided the students for their Post graduate as well as Doctorate degrees.