DYNAMIC RESOURCE AND TASK ALLOCATION USING WIRELESS CLOUD IN MOBILE CLOUD COMPUTING

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ABSTRACT

Resource allocation is the main issue in mobile cloud computing. Many researches has been worked for allocating resources in cloud system. Many algorithms are designed and implemented for this purpose. This paper proposes wireless cloud model in which mobile users can access cloud using wireless network. The proposed model is used for efficient power utilization. The main goal of this model is to dynamically allocate resources to end user. Thus this paper focuses on to optimize objective of mobile user.

Keywords *— Collaborative mobile cloud, cloudlet, energy minimization, mobile cloud offloading resource and task allocation, wireless cloud.*

1. INTRODUCTION

Resource allocation plays an important role in mobile cloud computing. Different resource allocation schemes are designed. such as wireless power transfer technology in used in Collaborative mobile cloud (CMC) systems for transferring information and power at a time, this improves battery lifetime as well as energy consumption is reduced[1].To facilitate simultaneous data and power transfer technology, a receiver architecture is proposed. This architecture can split the received power into two power stream. MIMO system along with receivers are used to maximize the harvested energy [2]. A mobile architecture is proposed to offload high power consuming workloads to cloud servers, which helps in lower energy consumption locally. Later cloudlets are introduced with computing capabilities for improving latencies in cloud servers and mobile devices [3]. An update-triggered full-file synchronization (UFS) algorithm is proposed. In which once update occurs the full content of the file F is updated to the cloud server and synchronized with mobile users. It is easy to implement. For improvement timer-triggered algorithm is introduced in which timer is pre-defined. When the timer expires, the

full content of the updated file F is synchronized to mobile users [4]. A Vickrey-based double auction model is proposed for auction mechanism. It achieves system efficiency and it is budget balanced. It is fairly efficient and truthful [5].

This paper introduces different resource allocation strategies such as resource allocation using collaborative mobile clouds (CMC), resource allocation using wireless collaborative mobile clouds (WECMC), dynamic resource allocation algorithm, synchronization algorithm, and auction-based resource allocation. All these strategies are better for resource allocation but there are some problems such drawbacks are overcome by newly proposed wireless cloud technology. This proposed model facilitate resource allocation as well as improves power transfer enabled model in cloud systems.

2. BACKGROUND

Many studies have been done on resource allocation algorithms that are applied in mobile cloud system differently over recent years. Such algorithms are used in different cloud model such as Resource allocation in collaborative mobile clouds (CMC) system. As the name suggest in this system cloud resources works in collaboration with each other. In this system data is transfer to each terminal in chunk, this data is shared by MTs using SR transmission [1].Resource allocation in wireless collaborative mobile cloud is same to that of CMC except that here transmission of data from base station to mobile terminals is done wirelessly [2].In dynamic resource allocation algorithm task are classified into off loadable, non-off loadable, and traffic. Resources are consumed depending on task type and thus scheduled [3]. In Synchronization algorithm the updated data is aggregated to control synchronization traffic .In this a file is updated and synchronized by cloud server. First aggregation is performed on files then synchronization is done [4]. Auction based resource allocation model is proposed for satisfying service demands of mobile devices .In which mobile devices acts as buyers and cloudlet acts as sellers. An auction mechanism is incentive compatible or truthful [5].

This paper introduces resource allocation mechanisms such as resource allocation using collaborative mobile clouds (CMC), resource allocation using wireless collaborative mobile clouds (WECMC), dynamic resource allocation algorithm, synchronization algorithm, and auction-based resource allocation. These are organized as follows:

Section I Introduction. **Section II** discusses Background. **Section III** discusses previous work. **Section IV** discusses existing methodologies. **Section V** discusses analysis and discussion **Section VI present** overview of wireless cloud model. Its outcome possible results are analyzed in **Section VII**. **Section VIII** concludes this paper. Finally **Section IX** presents future scope.

3. PREVIOUS WORK DONE

Zheng Chang (2016) [1] has proposed a resource allocation scheme for CMC. In which mobile terminals collaborates with each other for sharing data send through base station. Thus instead of waiting for completion of one reception, data is send in segments.Zheng Chang (2016) [2] has proposed the resource allocation scheme similar to previous one for wireless CMC system. But the basic difference is that this CMC system is wireless .means mobile terminals communicate to each other and with base station by wireless means. Jeongho Kwak (2015) [3] has proposed dynamic resource allocation mechanism. In this algorithm resources are scheduled based on task type i.e. off loadable, non-off loadable, traffic, and based on this task type resources are allocated to them. Giwon Lee (2017) [4] has proposed a synchronization algorithm. This algorithm is designed in case if the data is frequently updated and the number of mobile users sharing the data is large, the synchronization traffic is there. This algorithm synchronized the updated data to satisfy consistency. A-Long Jin (2015) [5] has proposed a auction mechanism for sharing cloudlets. In this auction mechanism mobile devices are buyers and cloudlets are sellers. Buyers submit its bid to auctioneer privately so that buyers don't have idea of others bid.

4 .EXISTING METHODOLOGIES

Many resource allocation schemes are implemented over years. These schemes are applied over different cloud structures. Various resource allocation algorithms are implemented for different cloud system such as resource allocation using collaborative mobile clouds (CMC), resource allocation using wireless collaborative mobile clouds (WECMC), dynamic resource allocation algorithm, synchronization algorithm, and auction-based resource allocation.

4.1 RESOURCE ALLOCATION IN CMC

In collaborative cloud systems consists of three Mobile terminals and one base station. In conventional system data is shared with LR technology, while in CMC SR transmission is used. In this paper CMC system consists of three Mobile terminals MT's and one Base station BS. Data stream is divided into nine segments. During transmission procedure in conventional system communication interface has to remain active for whole reception due to LR transmission. But in CMC, data is divided into segments by base station .Then this data is shared by different MT's through SR transmission.SR technology has better data rate than LR. Thus the reception duration is reduced with SR transmission. Thus this system focus on reducing energy consumption of devices.

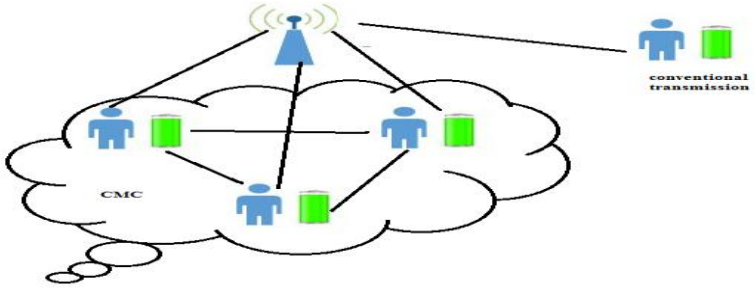

Fig 4.1 Collaborative Mobile Clouds

4.2 RESOURCE ALLOCATION IN WIRELESS COLLABARATIVE MOBILE CLOUDS (WECMC)

In wireless collaborative cloud system there is one MT and N number of Mobile terminals who are downloading content from Base station .Base station is having more than one antenna and each MT has single antenna. During transmission procedure base station divides data into different chunks, after which each MT's share this data with one another through SR transmission. Thus reception duration is reduce than conventional transmission.

4.3 DYNAMIC RESOURCE ALLOCATION ALGORITHM

This algorithm is designed for minimizing minimize energy consumption of a mobile device for given delay constraints considering network traffic and off loadable/non-off loadable workloads in a unified framework. This algorithm is first to jointly optimize cloud offloading policy and CPU/network speed scaling. In cloud system this algorithm works as follows:

System tasks are divided into three types i.e. off loadable, non -off loadable, traffic, an independent time slot is allotted to each type task. The DREAM algorithm is design by invoking Lyapunov drift plus penalty technique, which has advantages in the sense that it does not require information about the distribution of workload arrivals and future network states, but only needs to know information of the current queue lengths and throughput. The original objective of this paper is to minimize CPU and network energy consumption while stabilizing total task queues in (P). Lyapunov function and Lyapunov drift function as follows:

$$L(t)=1/2\{Qp(t)2 + Qc(t)2 + Qn(t)2\}$$

$$(L(t))= E\ \{L(t + 1) - L(t)|Q(t)\}$$

Where, $Q(t) = \{Qp(t), Qc(t), Qn\ (t)\}$ and Qp,Qc,Qn are queue lengths of PA,CA,NA i.e. different task queues.

4.4 SYNCHRONIZATION ALGORITHM

Synchronization algorithm in cloud system is used to reduce synchronization traffic. This algorithm aggregates updated data to reduce traffic. This algorithm works as follows:

A file F is shared by different mobile nodes is synchronized by cloud server. Let d be the difference of new and old version of file. There are two mobile nodes i.e. Write-node and Read-node. Each write-node and Read-node has allotted time interval. When write- node is activated then File F is updated in cloud server during writing connection. On the other hand when R-node is activated then read operation is done on file. Thus is algorithm is useful for reducing synchronization traffic.

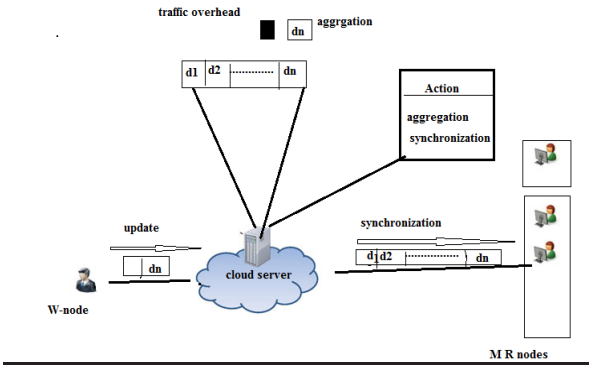

Fig 4.4 system model

4.5. AUCTION-BASED MODEL

In this auction mechanism cloudlets are offer resource pools closer to the network edge. Cloudlets reduce load of mobile devices. These cloudlet's offers different services to different mobile devices based on various factors. Cloudlets can be paid for sharing resources. There are three components includes in ICAM:

1. Buyers: The mobile devices are buyers in this auction. For each buyer bi ∈ B, B = {b1, b2, . . . ,bn}, its bid vector is denoted by Di = (D1i ,D2i , . . . ,Dmi), where Dji is the bid for seller sj ∈ S, S = {s1, s2, . . . , sm}.

2. Seller: Cloudlets are sellers. For all sellers in S, the ask vector is denoted by A = (A1,A2, . . . ,Am).

3. Auctioneer: A control centre closest to the participants can serve as the auctioneer to reduce the communication cost and delay.

the auctioneer first identifies the winning candidates. Then, each winning seller candidate is assigned to one winning buyer candidate. The new stage of winner elimination can guarantee that a winning buyer is assigned to only one winning seller.

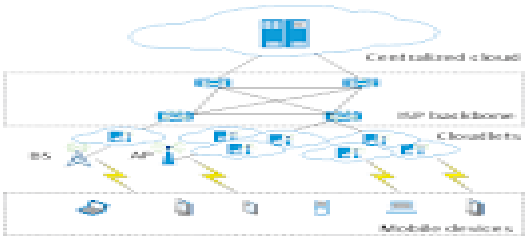

Fig 4.5 auction based model

5. ANALYSIS AND DISCUSSION

Resource allocation in CMC shows use of CMC can gain promising energy saving compared to conventional transmission. In CMC energy from RF signal can be recycled which improves energy consumption [1]. The performance of system using CMC is optimal. Resource allocation using WECMC shows WECMC can reduce energy consumption and improves system performance compared to traditional one [2]. The energy saving done due to mobile cloud. Dynamic resource allocation algorithm shows that with use of this algorithm energy consumption is highly reduced [3]. This algorithm is imperative. It not only saves energy but also improves delay performance. Synchronization algorithm shows that it provide higher expected total reward than other aggregation algorithms under different environments [4].It reduce the synchronization traffic and synchronizes the aggregated one periodically to satisfy the consistency. Auction based model shows that this model can effectively allocate cloudlet resources to among mobile users to satisfy their service demands while maintaining the desirable properties including the computational efficiency , individual rationality ,budget balance, truthfulness for buyers and sellers [5].

6. PROPOSED METHODOLOGY

In proposed wireless cloud model user access application cloud via wireless cloud. As todays smartphones can support WLAN and cellular technologies simultaneously, and large number of mobile application run on at a time it needs to offload task to cloud for power saving. This offload is done by considering different parameters like battery lifetime, processing load, storage capacity etc.

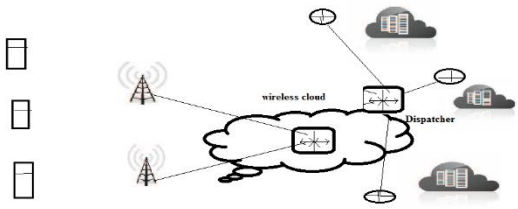

Fig 6.1. wireless cloud model

Algorithm:

Step 1: Select Resources and network

Step 2: Find Resources and network constraints

Step 3: Select device

Step4: Select application

Step 5: Find user constraints

Step 6: Execute

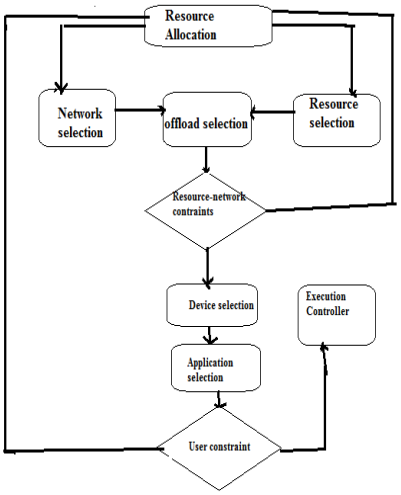

Fig 6.2. Algorithm Architecture

7. OUTCOME AND POSSIBLE RESULTS

The proposed wireless cloud model provides resources to user efficiently .It also useful for power utilization. This model is consider as next generation mobile communication model. With the help of this model system performance can be improved as it supports large number of mobile applications running at a time.

This model also considers other system parameters like battery lifetime, storage capacity etc. for improving system performance.

8. CONCLUSION

This paper focused on various resource allocation scheme and introduced problems present in previous methodologies. To overcome these drawbacks this paper proposed wireless cloud model that manages and provides resources efficiently

9. FUTURE SCOPE

From observation, the scope is planned to be studied in future work, analysis will done for variant resource allocation mechanism that can provide resources conveniently and also improves system performance.

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