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Efficient Timeslot Assignment and Route Discovery Mechanism for Mobile Clients

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***Abstract*-- Recent advances in wireless data networking and portable information appliances have engendered a new paradigm of computing, called mobile computing, [5] in which users carrying portable devices have access to data and information services regardless of their physical location or movement behaviour. In the mean time, research addressing information access in the mobile environments has proliferated. In this project, the efficient path between the mobile clients is found based on the route discovery mechanism. This is done on the basis of average fading and non-average fading ratio. By finding the efficient path we can eliminate packet loss and delay etc. In addition to this bandwidth can be utilized properly between the base station and the clients using centralized online and distributed online algorithms. In centralized online algorithm [1] a centralized server collects information and schedules the downloading based on its current knowledge. In the distributed online algorithm there is no centralized server with knowledge of all clients. Every base station is responsible for collecting its own bandwidth, By considering these two things a near optimal throughput can be achieved.**

***Index terms*-- mobile computing, network optimization, scheduling, wireless.**

I. INTRODUCTION

In mobile data access applications, [1] mobile clients equipped with wireless communication capability travel with a equipped with wireless communication capability travel within a region, interacting with service providers i.e., access points (APs) or base stations (BS) in order to access information or receive service. For example, in Vehicle road-side [2],[8] pre deployed Road Side Units (RSU) provide data access to vehicles as they pass by. In this mobile clients are considered travel towards their destination where they have mission to complete, according to precise instructions. For example in a search and rescue (SAR) mission prompted by an event such as an earthquake or hurricane, the SAR team may need to receive detailed instructions and other information, including e.g., expected number of survivors, by the time they reach the location of emergency, in order to most effectively perform their duties.

Wireless link has a limited range so the client must download its data item from one of the BSs lying sufficiently near to its route. The time to transfer the data depends on the data item size and the channels transmission rate. Because clients are moving, there will be a limited time window (possibly empty) in which they are able to receive data from each particular BS. In order for a given client to succeed, therefore, its data item must be downloaded from a BS during the feasible time window in which the client is in the communication range. Although more than one BS are deployed, many clients may compete for the exclusive usage of a BSs channel. Due to limited bandwidth between BSs and clients, [1] decision has to be made to allocate channels to multiple clients. In the mission-oriented scenario, mobile client's travels towards destinations where they have missions complete, according to precise instructions.

II. RELATED WORK

A. BROADCAST PROGRAM

Advances in wireless networking technology and portable information appliances have engendered a new paradigm of computing, called mobile computing; [4] in which users who carry portable devices have access to information services through a shared infrastructure. Regardless of their physical location or movement behaviour a new environment introduces new technical challenges in the area of information access. Traditional techniques for information access are based on the assumptions that the location of hosts in distributed systems does not change and the connection among hosts also does not change during the computation. In a mobile environment, however, these assumptions are rarely valid or appropriate. Mobile computing is distinguished from classical, fixed-connection computing due to the following reasons.

- The mobility of nomadic users and their computers.
- The mobile resource constraints such as limited wireless bandwidth and limited battery life.

The mobility of nomadic users implies that the users might connect from different access points through wireless links and might want to stay connected while on the move, despite possible intermittent disconnection. Wireless links are relatively unreliable and currently are two or three orders of magnitude slower than wireless networks. Moreover, mobile hosts powered by batteries suffer from the limited battery life constraints. These constraints and limitations leave much work to be done before mobile computing is fully enabled. This remains true despite the recent advances in wireless data communication networks and hand-held device technologies.

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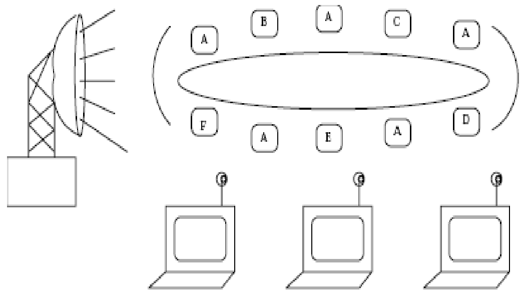

Fig. 1

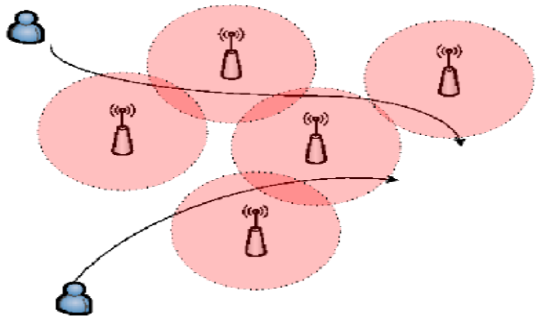

Fig. 2

B. VEHICLE ROADSIDE DATA ARCHITECTURE

Vehicles can only download data within a time window which is decided by transmission range, distance to the RSU [8], and the vehicle speed. Multiple vehicles also compete for the exclusive usage of the common broadcast channel. Therefore, scheduling access by multiple vehicles within time constraints is the challenge.

Existing system has the unrelated machines scheduling problem (USP), minimizes the total weighted flow time, subject to time-window job availability and machine down constraints. One of the existing techniques parallel-machine scheduling considers release times and deadlines to be both job and machine dependent. Scheduling theory is considered with the optimum allocation of scarce resources to activities over time. Two-step scheduling algorithm is used. It is assumed that each vehicle knows the service deadline of its request. This is reasonable because when a vehicle with GPS device enters the coverage area of a RSU, it can estimate its leaving time based on the knowledge of its driving velocity and its geographic position.

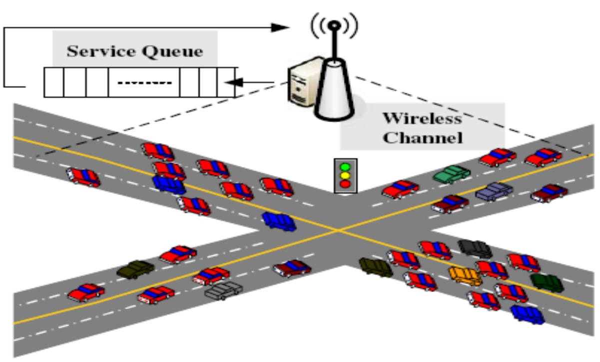

Fig. 3

Data access in vehicular networks has two unique features: The arrival request is only active for a short period of time due to vehicle moving and coverage limitations of RSUs. When vehicles move out of the RSU area, the requests not served have to be dropped and data items can be downloaded and uploaded from the RSU server. The download and update requests compete for the service bandwidth.

C. SATELLITE BASED BROADCAST ARCHITECTURE

There is also a satellite based broadcast architecture [4] that captures all essential components of a typical on-demand broadcast system. In this architecture, a large group of clients retrieve data items maintained by a data server. The clients send requests to the server through an uplink channel. Each request is characterized by a 3- tuple: (id, t, d) where id is the identifier of the requested item, t is the time of the request, and d is a relative deadline. The absolute (service) deadline of a request is given by t and d beyond which the receipt of the requested item is considered useless to the client. The client monitors a downlink broadcast channel for the requested item until the item is broadcast or the lifetime of the request expires. The uplink and downlink channels are independent.

On receiving a request, the server inserts it into a service queue. An outstanding request is said to be active if its life time has not expired. Active requests remain in the service queue until they are serviced or their lifetimes expire, whichever take place earlier.

All data items are assumed to be locally available on the server. The server broadcast data items based on a scheduling algorithm. The primary goal of a scheduling algorithm is to be satisfying as many requests as possible. This can be measured by request drop rate, which is defined as the ratio of the number of requests missing their deadlines to the total number of requests. At each broadcast instance, the scheduler selects a new item from the active requests. The selected item is sent to the network controller for broadcast and the associated request(s) are removed from the service queue. New factors are focused that affect the performance of time-critical broadcast scheduling in addition to those previously considered in unicast scheduling. For simplicity, all data items are assumed to have equal size. The variable size data items can be easily handled by incorporating the factor of item size into our broadcast scheduling algorithm. In general, smaller items should be given higher priority than larger items in order to improve request drop rate.

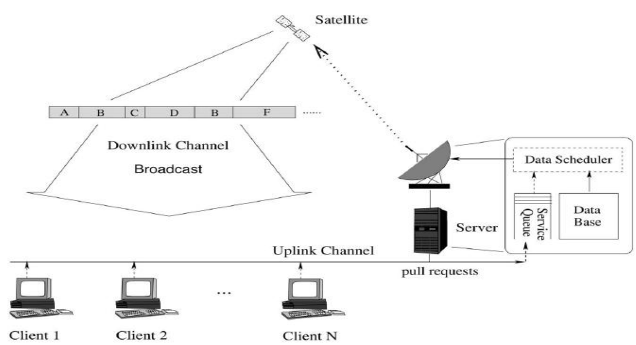

Fig. 4

III. PROPOSED WORK

In the proposed work, existing algorithms is adapted for related scheduling problems and also propose new algorithms, for multiple machine-dependent times settings including offline and online algorithms, which is evaluated with synthetic data as well as real-world data sets obtained from UMass. In addition to the general problems, a realistic environment is considered in which the mobile clients speed and the time; the latter variation is perhaps due to unforeseen requests for data. These algorithms are adapted using an estimated bandwidth and show the resilience of different algorithms.

The algorithms are evaluated on cases with uniform weights and firm deadlines as well as in more general settings, in which weights degrade over time, corresponding to soft deadlines. Assuming the weight of a job remains constant over its time window on each machine, the latter situation is interpreted into the case with machine dependent weights. The algorithms are evaluated with different weight degradation functions and summarize the limitations of these algorithms

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IV. SYSTEM ARCHITECTURE

Two system architectures are proposed for generating the delivery schedules.

- Centralized system
- Distributed system

A. CENTRALIZED SYSTEM

In the centralized system, a single server receives information updates from all locations and acts as the scheduler. This server is assumed to be powerful to solve IP (integer programming) problems. This server is used to solve the problem near optimally by IP or offline algorithms. However, in practice unpredictable things may happen which degrade performance. For example, bandwidth may change a complication that is difficult to integrate into the IP or offline algorithms or in another case new jobs appear from time to time, so frequent information updates will require that the centralized scheduling algorithms be run frequently, which may involve unacceptable system overhead.

In the centralized online setting, a centralized server collects information and schedules the downloading based on its current knowledge. The server is unaware of each client until it appears. For example, in a SAR mission, a command centre controls the delivery of information to the team members, but not until the beginning of the mission does it know about which members are needed and their current locations. Even after the mission starts, it does not know anything about the future needs. Therefore, it can only schedule the downloading according to its current knowledge and make adjustment later on. The results at each step are treated as reservations which may or may not be pre-empted by new coming clients. For a highly dynamic system, it may become burdensome to run global admission too often.

B. DISTRIBUTED SYSTEM

In the distributed online setting there is no centralized server with knowledge of all client pairs. Every BS is responsible for allocating its own bandwidth; no advanced reservations are allowed. Missions arrive spontaneously, and paths are planned dynamically. For example, a handheld device user may suddenly request to download information. The client then sends a request to a BS within communication range, including data description and weight. Upon receipt of such a request, the BS can calculate its time window based on its communication range and the clients speed vector. Clients whose requests are rejected may then turn to other BSs. In the distributed system, trade optimally for flexibility. On the one hand, near optimal solutions will be harder to obtain in the absence of global information. On the other hand, a distributed system is more suitable for highly dynamic problems because machines can make scheduling decisions based on local and current information. Moreover, with each node using best-effort algorithms, such computations will be much faster and involve lower overhead.

V. MODULE DIAGRAM

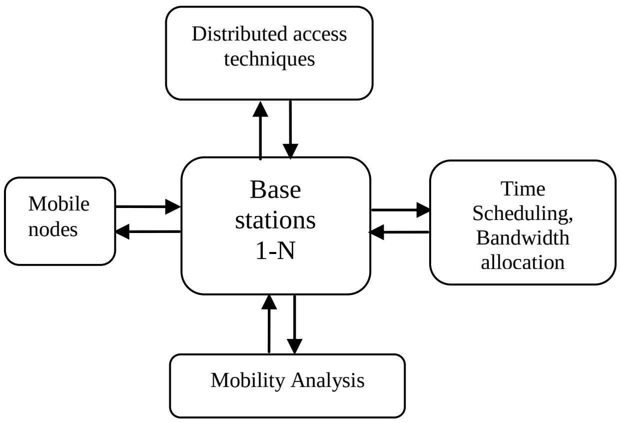

Fig. 5

In this module both the input and the output is the mobile nodes only. First initially, the mobile node will access the base station. Depending upon the arrival of the mobile nodes mobility analysis will be done. Mobility analysis includes the data file size of the client and it calculates the entering time into the base station and the time index calculation will be performed. Bandwidth allocation will be done on the based on the data file size of the client and time scheduling will be done on the time index calculation.

Distributed access technique includes unit processing time and arbitrary processing time. Unit processing time is the time taken to process the information from the source to the destination and arbitrary processing time is the time taken after completion of the process. By calculating everything the requested information will be send to the mobile nodes while sending the information there will not be a correct path or the path may have traffic. For finding the efficient path route discovery mechanism is used. Route discovery mechanism is used to find the efficient path and it also reduces the traffic between the mobile clients. Here topology is built using ns2 simulator. When the link failure occurs in the network, the alternate path is found and the packets are transmitted through the new path. Route discovery mechanism includes three steps

- To calculate the distance from one node to all the other nodes.
- Selection of source and destination to forward the packets.
- To find the efficient path to forward the packets

VI. SIMULATION RESULTS

Creation of nodes which includes their source, destination and coverage region of each and every node is shown in figure 6.

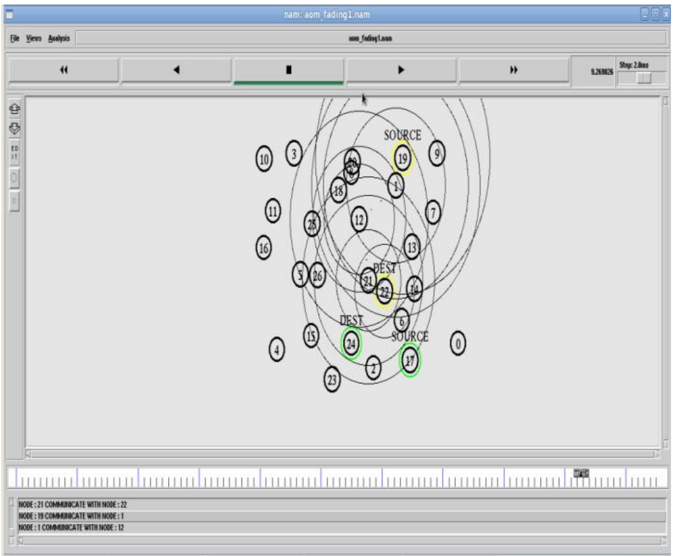

Fig. 6

Distance calculation from one nodes to all the other nodes is shown in figure 7.

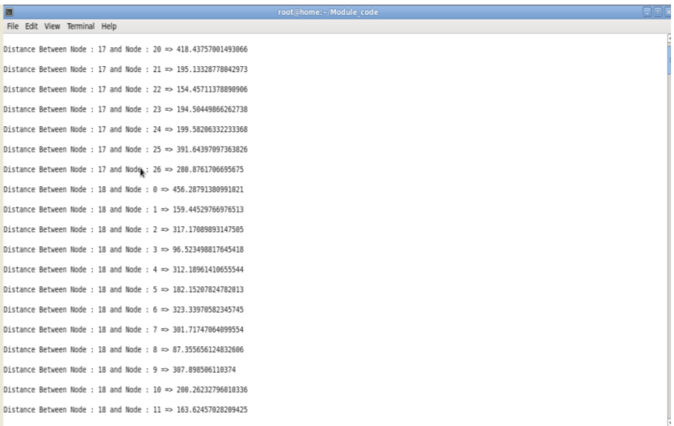

Fig. 7

Selection process is shown in figure 8.

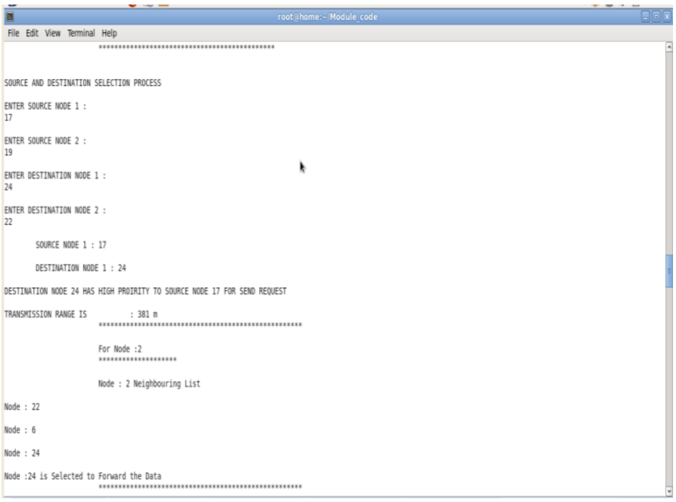

Fig. 8

Neighboring list of nodes is shown in figure 9.

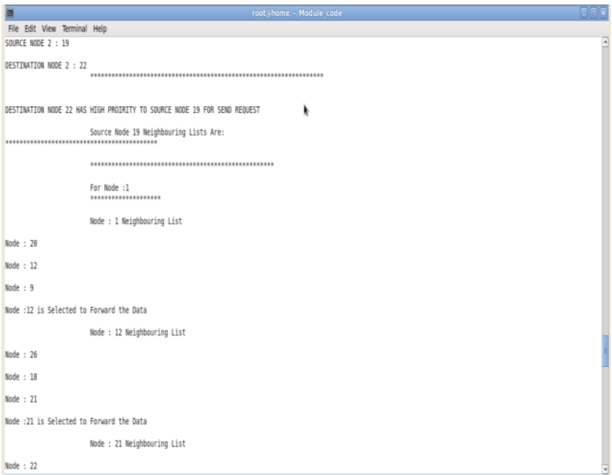

Fig. 9

Efficient path to forward the packets is shown in figure 10.

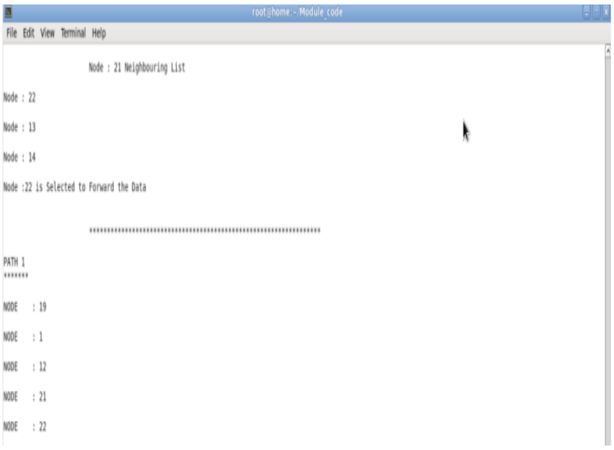

Fig. 10

Comparing Throughput

Throughput of the network is measured in simulation. The number of packets that are transmitted in the network is shown in the following graph. Throughput is measured after the link failure occurrence and after the link failure has been rectified. It is shown that the throughput after the link failure has been overcome is high i.e. 32%.

Comparing Packet Delivery Ratio

Packet Delivery Ratio is defined as the number of packets that are sent by the source node to the number of packets received by the destination. Packet delivery ratio is measured for the packets that are transmitted when the link failure occurs in the network and also after the link failure recovery in the network. Packet delivery ratio is high in the case of the after the recovery of the link failure in the network. By this, the packet loss is reduced by 4.28%.

Fig. 11 Graph representing throughput versus time

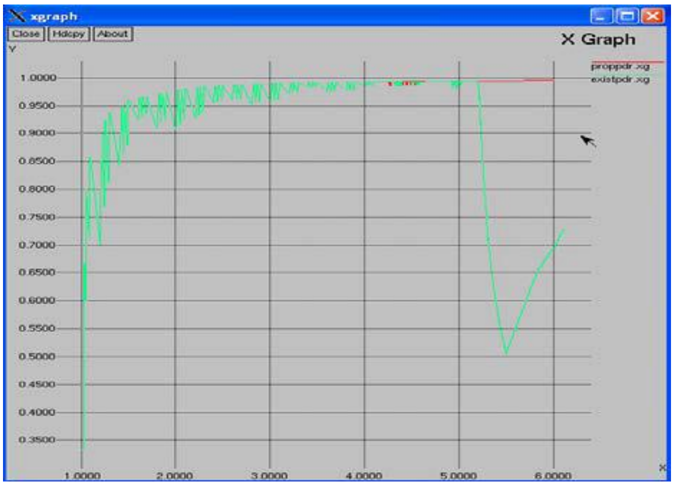

Fig. 12 Graph representing packet delivery ratio versus time

VII. CONCLUSION

In this project one class of scheduling problems is studied in which jobs have machine dependent release times and deadlines. This problem is created by scenarios in which data are delivered to mobile clients as they travel. To eliminate this problem a centralized and distributed architecture is used. A base station may have information about its neighbours or several close base stations could work jointly in a group to improve the distributed online algorithm. The centralized online algorithm works iteratively, each time rescheduling most jobs including the ones having reservations. Overhead could be reduced by an incremental algorithm that attempts to limit the number of revisions made to the existing schedule.

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