LOAD BALANCING LOCALIZATION USING THREE HOP ROUTING PROTOCOL

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ABSTRACT- In this project we proposed to improve routing performance in hybrid wireless networks. We using ad-hoc relay stations to dynamically relay traffic from one cell to another in order to avoid architectures in literature, and compared and discussed methods to reduce the cost of deployment for MCNs. The work investigates how to allocate the bandwidth to users to improve the performance of hybrid wireless networks. We further considered the wireless interference in optimizing the resource allocation in hybrid wireless networks. The work proposes a coalitional game theory based cooperative packet delivery scheme in hybrid wireless networks. There are also study radio frequency allocation for direction transmission and relay transmission in hybrid wireless networks. These works are orthogonal to our study in this paper and can be incorporated into DTR to further enhance its performance. The throughput capacity of the hybrid wireless network under different settings has also been an active research topic in the hybrid wireless network. Since Base stations are connected with a wired backbone, we assume that there are no bandwidth and power constraints on transmissions between Base stations. We use intermediate nodes to denote relay nodes that function as gateways connecting an infrastructure wireless network and a mobile ad-hoc network. Our DTR algorithm avoids the shortcomings of adhoc transmission in the previous routing algorithms that directly combine an ad-hoc transmission mode and a cellular transmission mode. Rather than using the multihop ad-hoc transmission, DTR uses two hop forwarding by relying on node movement and widespread base stations. All other aspects remain the same as those in the previous routing algorithms (including the interaction with the TCP layer). DTR works on the Internet layer. It receives packets from the TCP layer and routes it to the destination node, where DTR forwards the packet to the TCP layer. The data routing process in DTR can be divided into two steps: uplink from a source node to the first BS and downlink from the final BS to the data's destination.

Keywords:- Multihop adhoc tranmsission, HOP Routing Protocol

I. INTRODUCTION

Mobile computing is the discipline for creating an information management platform, which is free from spatial and temporal constraints. The freedom from these constraints allows its users to access and process desired information from anywhere in the space. The state of the user, static or mobile, does not affect the information management capability of the mobile platform. A user can continue to access and manipulate desired data while traveling on plane, in car, on ship, etc. Thus, the discipline creates an illusion that the desired data and sufficient processing power are available on the spot, where as in reality they may be located far away. Otherwise **Mobile computing** is a generic term used to refer to a variety of devices that allow people to access data and information from where ever they are.

DIFFERENT TYPES OF DEVICES USED FOR THE MOBILE COMPUTING:

1. *Personal digital assistant/enterprise digital assistant*
2. *Smartphones*
3. *Tablet computers*
4. *Netbooks*
5. *Ultra-mobile PCs*
6. *Wearable computers*
7. *Palmtops/pocket computers*

II. APPLICATIONS OF MOBILE COMPUTING

VEHICLES

Music, news, road conditions, weather reports, and other broadcast information are received via digital audio broadcasting (DAB) with 1.5 Mbit/s. For personal communication, a universal mobile telecommunications system (UMTS) phone might be available offering voice and data connectivity with 384 kbit/s. The current position of the car is determined via the global positioning system (GPS). Cars driving in the same area build a local ad-hoc network for the fast exchange of information in emergency situations or to help each other keep a safe distance. In case of an accident, not only will the airbag be triggered, but the police and ambulance service will be informed via an emergency call to a service provider.

Buses, trucks, and trains are already transmitting maintenance and logistic information to their home base, which helps to improve organization (fleet management), and saves time and money.

EMERGENCY

An ambulance with a high-quality wireless connection to a hospital can carry vital information about injured persons to the hospital from the scene of the accident. All the necessary steps for this particular type of accident can be prepared and specialists can be consulted for an early diagnosis. Wireless networks are the only means of communication in the case of natural disasters such as hurricanes or earthquakes. In the worst cases, only decentralized, wireless ad-hoc networks survive.

BUSINESS

Managers can use mobile computers say, critical presentations to major customers. They can access the latest market share information. At a small recess, they can revise the presentation to take advantage of this information. They can communicate with the office about possible new offers and call meetings for discussing responds to the new proposals. Therefore, mobile computers can leverage competitive advantages. A travelling salesman today needs instant access to the company's database: to ensure that files on his or her laptop reflect the current situation, to enable the company to keep track of all activities of their travelling employees, to keep databases consistent etc. With wireless access, the laptop can be turned into a true mobile office, but efficient and powerful synchronization mechanisms are needed to ensure data consistency.

III. CHALLENGES IN MOBILE COMPUTING

Wireless and mobile environments bring different challenges to users and service providers when compared to fixed, wired networks. Physical constraints become much more important, such as device weight, battery power, screen size, portability, quality of radio transmission, error rates. Mobility brings additional uncertainties, as well as opportunities to provide new services and supplementary information to users in the locations where they find themselves. The major challenges in mobile computing are described including: low bandwidth, high error rate, power restrictions, security, limited capabilities, disconnection and problems due to client mobility.

LOW BANDWIDTH

Wireless networks deliver lower bandwidth than wired networks. As a result, mobile applications have to be carefully designed to control the bandwidth consumption. Software techniques required to improve effective bandwidth usage include data compression logging requests to combine multiple short ones, lazy write back, difference-based updates, caching, prefetching, usage of proxy, priority scheduling, etc.

HIGH ERROR RATE

The network quality varies as the mobile computer moves across the heterogeneous network connections. The wireless environment exhibits higher error rates, which results in retransmission and affects the Quality of Service. By minimizing the usage of wireless transmission, the data is less exposed to transmission errors. In addition, error correction schemes can be employed to improve performance. However, these schemes also add to the communication overhead and reduce the usable bandwidth.

POWER LIMITATIONS

Mobile computers are concerned with the limited power supply, an issue that does not appear in distributed wired environment. Hardware improvements on batteries can help to lengthen the life of a charge and reduce battery weight. In addition, efficient software operations can help to lower the power consumption. Examples include: shifting the processing to a fixed host, aggressively caching and prefetching data to reduce disk traffic, and transmitting less data while receiving more

SECURITY

Security and privacy are of specific concerns in wireless communication because of the ease of connecting to the wireless link anonymously. Common problems are impersonation, denial of service and tapping. The main technique used is encryption. In personal profiles of users are used to restrict access to the mobile units.

LIMITED CAPABILITIES

Unlike stationary computers, mobile computers are smaller in physical size and have smaller storage capacity. PDA's like Infopad and ParcTab are designed to have extreme portability and provide ubiquitous information access. However, their applications rely heavily on the interoperability of the pads and other servers. Even ordinary laptops typically have less RAM and smaller hard disks than stationary computers.

IV. BENEFITS OF MOBILE COMPUTING

- *Improve business productivity by streamlining interaction and taking advantage of immediate access*
- *Reduce business operations costs by increasing supply chain visibility, optimizing logistics and accelerating processes*

- *Strengthen customer relationships by creating more opportunities to connect, providing information at their fingertips when they need it most*
- *Gain competitive advantage by creating brand differentiation and expanding customer experience*
- *Increase work force effectiveness and capability by providing on-the-go access*
- *Improve business cycle processes by redesigning work flow to utilize mobile devices that interface with legacy applications*

V. ADVANTAGES OF MOBILE COMPUTING

Mobile computing has changed the complete landscape of human being life. Following are the clear advantages of Mobile Computing:

1. Location flexibility:

This has enabled user to work from anywhere as long as there is a connection established. A user can work without being in a fixed position. Their mobility ensures that they are able to carry out numerous tasks at the same time perform their stated jobs.

2. Saves Time:

The time consumed or wasted by travelling from different locations or to the office and back, have been slashed. One can now access all the important documents and files over a secure channel or portal and work as if they were on their computer. It has enhanced telecommuting in many companies. This also reduces unnecessary expenses that might be incurred.

3. Enhanced Productivity:

Productive nature has been boosted by the fact that a worker can simply work efficiently and effectively from which ever location they see comfortable and suitable. Users are able to work with comfortable environments.

4. Ease of research:

Research has been made easier, since users will go to the field and search for facts and feed them back to the system. It has also made it easier for field officer and researchers to collect and feed data from wherever they without making unnecessary trip to and from the office to the field.

5. Entertainment:

Video and audio recordings can now be streamed on the go using mobile computing. It's easy to access a wide variety of movies, educational and informative material. With the improvement and availability of high speed data connections at considerable costs, one is able to get all the entertainment they want as they browser the internet for streamed data. One can be able to watch news, movies, and documentaries among other entertainment offers over the internet. This was not such before mobile computing dawned on the computing world.

6. Streamlining of Business Processes:

Business processes are now easily available through secured connections. Basing on the factor of security, adequate measures have been put in place to ensure authentication and authorization of the user accessing those services.

Some business functions can be run over secure links and also the sharing of information between business partners. Also it's worth noting that lengthy travelling has been reduced, since there is the use of voice and video conferencing.

Meetings, seminars and other informative services can be conducted using the video and voice conferencing. This cuts down on travel time and expenditure.

VI PROPOSED SCHEME

- *Network Construction*
- *Uplink Data Routing*
- *Downlink Data Routing and Data Reconstruction*
- *Congestion Control in Base Stations*

NETWORK CONSTRUCTION

Since BSes are connected with a wired backbone, we assume that there are no bandwidth and power constraints on transmissions between BSes. We use intermediate nodes to denote relay nodes that function as gateways connecting an infrastructure wireless network and a mobile ad-hoc network.We assume every mobile node is dual-mode; that is, it has ad-hoc network interface such as a WLAN radio interface and infrastructure network interface. DTR aims to shift the routing burden from the adhoc network to the infrastructure network by taking advantage of widespread base stations in a hybrid wireless network. Rather than using one multi-hop path to forward a message to one BS, DTR uses at most two hops to relay the segments of a message to different BSes in a distributed manner, and relies on BSes to combine the segments.

UPLINK DATA ROUTING

In this module, we develop it in Router. When a source node wants to transmit a message stream to a destination node, it divides the message stream into a number of partial streams called segments and transmits each segment to a neighbor node. Upon receiving a segment from the source node, a neighbor node locally decides between direct transmission and relay transmission based on the QoS requirement of the application.

The neighbor nodes forward these segments in a distributed manner to nearby BSes. Relying on the infrastructure network routing, the BSes further transmit the segments to the BS where the destination node resides. The final BS rearranges the segments into the original order and forwards the segments to the destination. It uses the cellular IP transmission method to send segments to the destination if the destination moves to another BS during segment transmission. A long routing path will lead to high overhead, hot spots and low reliability. Thus, DTR tries to limit the path length. It uses one hop to forward the segments of a message in a distributed manner and uses another hop to find high-capacity forwarder for high performance routing. As a result, DTR limits the path length of uplink routing to two hops in order to avoid the problems of long-path multi-hop routing in the ad-hoc networks. Specifically, in the uplink routing, a source node initially divides its message stream into a number of segments, then transmits the segments to its neighbor nodes. The neighbor nodes forward segments to BSes, which will forward the segments to the BS where the destination resides.Below, we first explain how to define capacity, then introduce the way for a node to collect the capacity information from its neighbors, and finally present the details of the DTR routing algorithm.

DOWNLINK DATA ROUTING AND DATA RECONSTRUCTION

The message stream of a source node is divided into several segments. After a BS receives a segment, it needs to forward the segment to the BS, where the destination node resides (i.e., the destination BS). We use the mobile IP protocol to enable BSes to know the destination BS. In this protocol, each mobile node is associated with a home BS, which is the BS in the node's home network, regardless of its current location in the network. The home network of a node contains its registration information identified by its home address, which is a static IP address assigned by an ISP. In a hybrid wireless network, each BS periodically emits beacon signals to locate the mobile nodes in its range. When a mobile node mi moves away from its home BS, the BS where mi currently resides detects mi and sends its IP address to the home BS of mi. When a BS wants to contact mi, it contacts the home BS of mi to find the destination BS where mi currently resides at. However, the destination BS recorded in the home BS may not be the most up-to-date destination BS since destination mobile nodes switch between the coverage regions of different BSes during data transmission to them.

CONGESTION CONTROL IN BASE STATIONS

We propose a congestion control algorithm to avoid overloading BSes in uplink transmission and downlink transmission, respectively. In the hybrid wireless network, BSes send beacon messages to identify nearby mobile nodes. Taking advantage of this beacon strategy, once the workload of a BS, say Bi, exceeds a pre-defined threshold, Bi adds an extra bit in its beacon message to broadcast to all the nodes in its transmission range. Then, nodes near Bi know that Bi is overloaded and will not forward segments to Bi. When a node near Bi, say mi, needs to forward a segment to a BS, it will send the segment to Bi based on the DTR algorithm. In our congestion control algorithm, because Bi is overloaded, rather than targeting Bi, mi will forward the segment to a lightly loaded neighboring BS of Bi. To this end, node mi first queries a multi-hop path to a lightly loaded neighboring BS of Bi. Node mi broadcasts a query message into the system. In order to reduce the broadcasting overhead, a mobile node residing in the region of a BS not close to the destination BS drops the query. The nodes can determine their approximate relative positions to BSes by sensing the signal strengths from different BSes. Each node adds the strength of its received signal into its beacon message that is periodically exchanged between neighbor nodes so that the nodes can identify their relative positions to each other. Only those mobile nodes that stay farther than the query forwarder from the forwarder's BS forward the queries in the direction of the destination BS. In this way, the query can be forwarded to the destination BS faster.

VII DESIGN GOALS

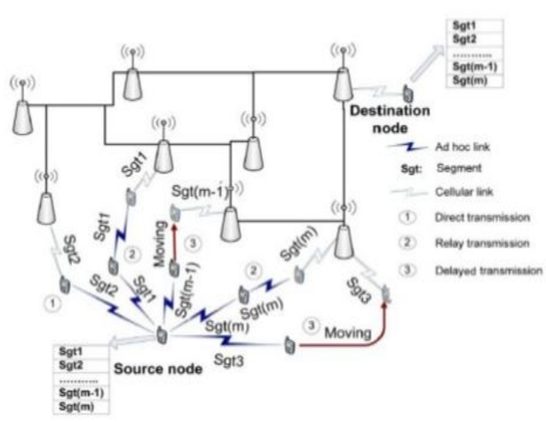

Figure - architecture of DTR Data transmission

The architecture of DTR Data transmission

Our DTR algorithm avoids the shortcomings of adhoc transmission in the previous routing algorithms that directly combine an ad-hoc transmission mode and a cellular transmission mode. Rather than using the multihop ad-hoc transmission, DTR uses two hop forwarding by relying on node movement and widespread base stations. All other aspects remain the same as those in the previous routing algorithms (including the interaction with the TCP layer). DTR works on the Internet layer. It receives packets from the TCP layer and routes it to the destination node, where DTR forwards the packet to the TCP layer. The data routing process in DTR can be divided into two steps: uplink from a source node to the first BS and downlink from the final BS to the data's destination. Critical problems that need to be solved include how a source node or relay node chooses nodes for efficient segment forwarding, and how to ensure that the final BS sends segments in the right order so that a destination node receives the correct data. Also, since traffic is not evenly distributed in the network, how to avoid overloading BSes is another problem. We will present the details for forwarding node selection in uplink transmission and present the segment structure that helps ensure the correct final order of segments in a message, and DTR's strategy for downlink transmission. It will present the congestion control algorithm for balancing a load between BSes.

VIII CONCLUSIONS

Hybrid wireless networks have been receiving increasing attention in recent years. A hybrid wireless network combining an infrastructure wireless network and a mobile ad-hoc network leverages their advantages to increase the throughput capacity of the system. However, current hybrid wireless networks simply combine the routing protocols in the two types of networks data transmission, which prevents them from achieving higher system capacity. In this paper, we propose a Distributed Three-hop Routing (DTR) data routing protocol that integrates the dual features of hybrid wireless networks in the data transmission process. In DTR, a source node divides a message stream into segments and transmits them to its mobile neighbors, which further forward the segments to their destination through an infrastructure network. DTR limits the routing path length to three, and always arranges for high-capacity nodes to forward data. Unlike most existing routing protocols, DTR produces significantly lower overhead by eliminating route discovery and maintenance. In addition, its distinguishing characteristics of short path length, short-distance transmission, and balanced load distribution provide high routing reliability and efficiency. DTR also has a congestion control algorithm to avoid load congestion in BSes in the case of unbalanced traffic distributions in networks. Theoretical analysis and simulation results show that DTR can dramatically improve the throughput capacity and scalability of hybrid wireless networks due to its high scalability, efficiency, and reliability and low overhead.

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