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DISTRIBUTED HASH TABLE

PARMAR GAURANG

Abstract:

Need for it?

A fundamental goal of researches in WSNs is to reduce the communication operations and prolong the total lifetime of sensor networks.

Making effective use of the vast amounts of data gathered by large scale sensor networks will require scalable, self-organizing, and energy-efficient data dissemination algorithms

*Distributed Hash Tables (DHTs) over WSNs is a new routing paradigm promises **several** advantages over conventional routing protocols*

CONCEPT SHOULD BE CLEAR BEFORE IT?

- hashing
- distributed hash table
- GPSR
- directed diffusion
- clustering
- data centric storage
- perimeter refresh protocol

ROUTING TECHNIQUES USING DHTS OVER WSNS

1) GHT (Geographic Hash Table)

Assumption:

- >large scale sensor network spread out over an area which geographical boundary is known
- >nodes know their geographical position this can be achieved through GPS.
- >sensor network is connected to the outside world by some access point.
- >the data dissemination algorithms should seek to minimize communication in order to extend overall system lifetime.
- >GHT uses a novel perimeter refresh protocol to provide both persistence and consistency when nodes fail or move.

KEY WORDS:

home node:

Title : DISTRIBUTED HASH TABLE
Source:Golden Research Thoughts [2231-5063] PARMAR GAURANG yr:2013 vol:2 iss:7.

DISTRIBUTED HASH TABLE



We define the home node for a GHT packet to be the node geographically nearest the destination coordinates of the packet. The home node serves as the rendezvous point for Put() and Get() operations on the same key.

Home perimeter:

the path between home node and node which have detected event is called home perimeter.

Perimeter refreshes protocol:

GHT uses the perimeter refresh protocol (PRP) to accomplish replication of key-value pairs and their consistent placement at the appropriate home nodes when the network topology changes.

PRP stores a copy of a key-value pair at each node on the home perimeter.

PRP generates refresh packets periodically using a simple timer scheme. Every T_h seconds, the home node for a key generates a refresh packet addressed to the hashed location of that key. The refresh contains the data stored for that key, and is routed exactly as are Get() and Put() packets in GHT.

Working:

First, Data Dissemination is start with flooding the task to be done by entire sensor network, The tasks specify which events to detect, how to detect them, and what actions to take upon detection.

When event has been detected there will be three options to store the event information based on location...

- 1)external storage
- 2)local storage
- 3)data centric storage

setup, the costs are as follows:

External Storage:

$$\text{Total: } D_{total}\sqrt{n}$$

$$\text{Hotspot: } D_{total}$$

Local Storage:

$$\text{Total: } Qn + D_q\sqrt{n}$$

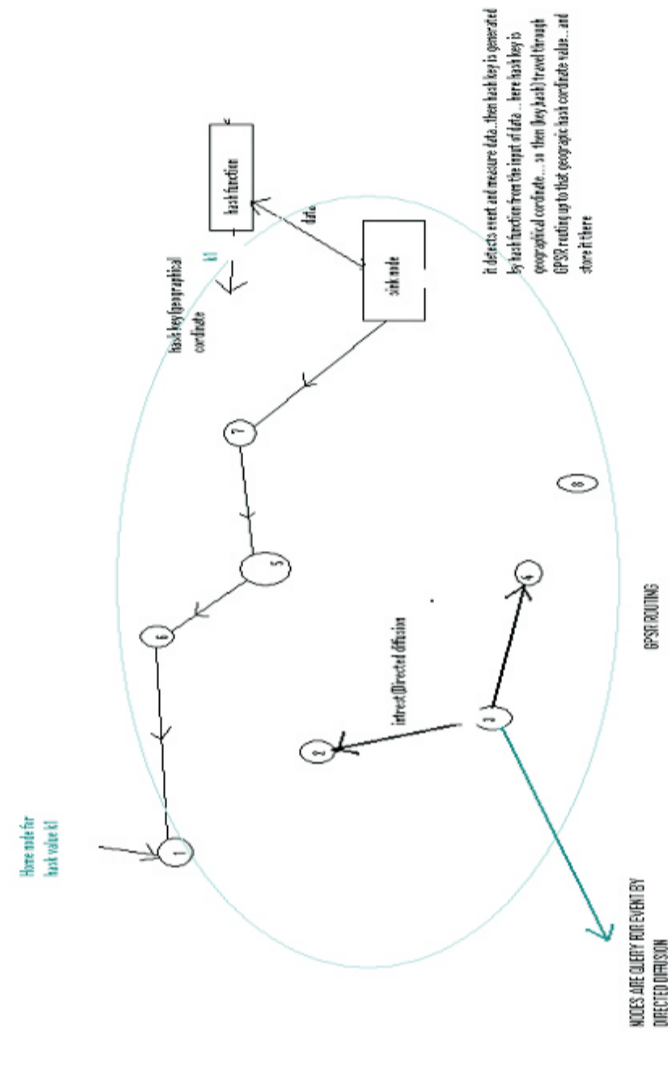
$$\text{Hotspot: } Q + D_q$$

Data-Centric Storage:

$$\text{Total: } Q\sqrt{n} + D_{total}\sqrt{n} + D_q\sqrt{n} \text{ (list)}$$

$$\text{Total: } Q\sqrt{n} + D_{total}\sqrt{n} + Q\sqrt{n} \text{ (summary)}$$

$$\text{Hotspot: } Q + D_q \text{ (list) or } 2Q \text{ (summary)}$$



NEEDS A QUERY ROUTE EVEN BY DIRECTED OVERLAP

- > sink first generate interest for particular event and then broadcast it.
- > source which have info about that event then create a routing path from source to destination.
- > data is transfer from source to destination...

future work:

still need investigate

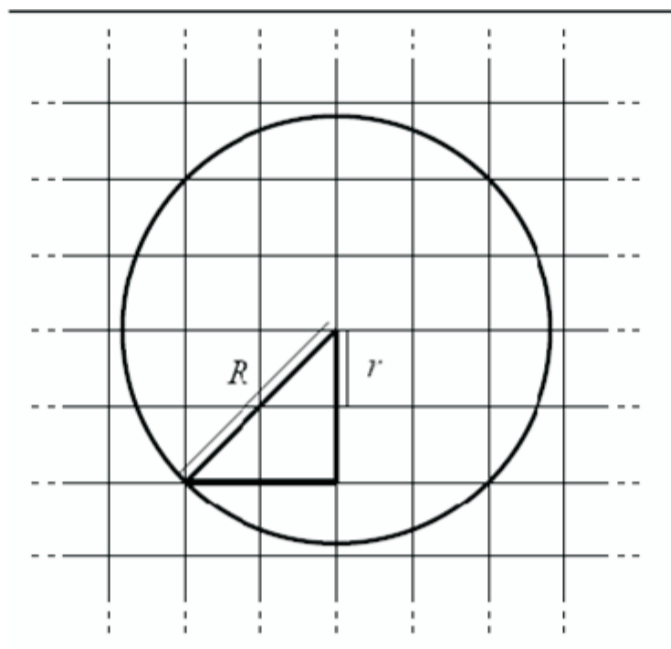
Foremost among these is the effect of varying node density. To avoid hashing keys to points outside the sensor net, GHT requires approximate knowledge of a sensor net's boundary. An open research problem is to devise scalable distributed algorithms to map these (possibly changing!) geographic boundaries.

2) CSN (Chord for sensor networks)

Chord for a sensor network (CSN) that uses the Chord's DHT over the sensor network. CSN is used to bound times for data lookup, --- still not clear...

3) CHR (Cell Hash Routing)

In CHR we divide the space into equally-sized cells that have the shape of squares, as the grid depicted in Figure 1.



DIVISION INTO CELLS:

The size of the cells is limited by the communication range of the nodes, because we require that a node in a cell can always listen to any other node either in its own cell or in any adjacent cell. This restriction ensures that in most circumstances, the clustered network stays connected, as long as the initial network is also connected. If we assume that nodes have a communication range of R , the resulting square side is at most $R/\sqrt{2}$. This can be seen in Figure 1.

Nodes need to be aware of other nodes in the neighboring cells, mainly for two reasons: i) the routing scheme requires nodes to know whether or not the adjacent cells are populated and ii) we do not require nodes to perform some kind of leader election algorithm;

ASSUMPTION:

- 1) All the nodes know and can reach all the other nodes in their own and in any of the adjacent cells.
- 2) A broadcast message inside a cell is received by all nodes of that cell.

The purpose of Assumption (1) is to ensure that a node has sufficient knowledge to route messages and to support the DHT in the clustered hierarchy.

The purpose of Assumption (2) is to ensure a simple means of communication among nodes of the same cell, to enable operation of the DHT.

CONCLUSION AND FUTURE WORK:

The results presented here show that CHR is a viable alternative to build a DHT for ad hoc wireless networks. Therefore we plan to pursue this work, by designing a complementary set of mechanisms that address the limitations of this current implementation. Namely:

DYNAMIC CELL STRUCTURE:

when the number of nodes in a cell drops below h , the cell is considered empty. On the contrary, the cell needs to acquire h nodes before it is considered populated ($h > 1$). Note that the value h should be fairly small. As a consequence, knowing h does not require much memory, because, in

general, a node will not need to know all the neighbors in its own cell (i.e., Assumption 2.1 can be relaxed). A cell leaving the network delivers its keys to its home cell. An entering cell needs to query its home perimeter to receive its keys. Additionally, it will also receive keys of empty cells for which it becomes the home cell.

General non-UDG model:

in more general models, it is possible for a node not to see some of its neighbors in its cell or in some adjacent cell. One possible approach to overcome this problem is to create routing tables to reach only the invisible nodes inside the cell or adjacent cells.

Incorrect determination of position:

in this paper, we assumed that nodes can always determine their position exactly, which is actually not the case. The consequence of this is that a node may consider itself to be in the wrong cell. In a sense, this resumes to the non-UDG model.

Cluster induces disconnection:

occasionally, the clustering mechanism may disconnect the network. This event should be rare, especially in denser networks, where use of CHR is more worthwhile. A straightforward solution consists of creating the necessary links and then using a geographically-scoped broadcast to remove intersections.

Fault-tolerance requirements:

one of the occurrences that CHR should try to avoid as much as possible is the loss of stored (key,value) pairs. We already suggested the use of thresholds to ensure that keys are sufficiently spread among nodes of the same cell. This mechanism can be complemented with a technique already used in wired DHTs, e.g., [18], that consists of using k hash keys to replicate contents in different cells.

4)T-DHT (Topology based Distributed Hash Table)

Using a virtual coordinate system, we construct a distributed hash table which is strongly oriented to the underlying network topology. Thus, adjacent areas in the hash table commonly have a direct link in the network. Routing in the T-DHT guarantees reachability and introduces low hopoverhead compared with the shortest path.

OVERVIEW OF WORKING:

the proposed algorithm does not rely on position information. Building a TDHT consists of two steps:

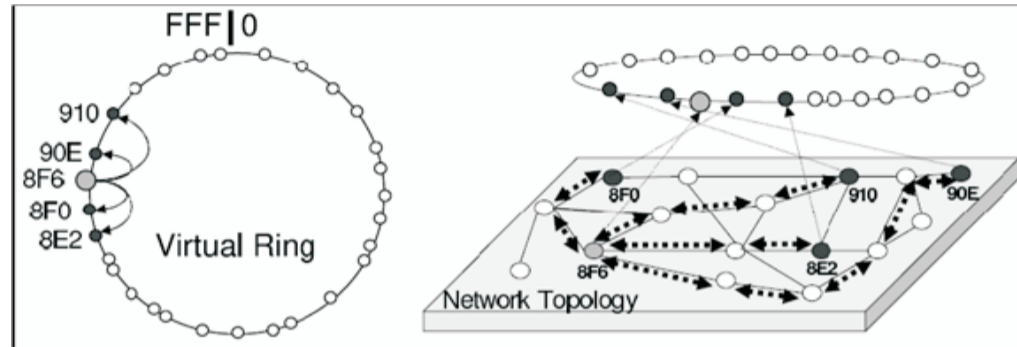
- (1) The construction of a virtual coordinate space which represents the network topology.
- (2) On top of these coordinates we build a two-dimensional hash table, where each node maintains the data close to its virtual position.

first step can be achieved by light weight virtual coordinate system

FUTURE WORK:

The presented scheme is ongoing work, and many interesting questions still need to be addressed. Currently, we are evaluating the impact of the positions of the reference nodes as well as the number of reference nodes. Furthermore, we will evaluate the improvement in routing performance arising from maintaining a two-hop neighborhood.

5)VRR and(Virtual Ring Routing)



6) Scatter Pastry.

COMPARISON:

Table 1. Comparison of methods used DHTs in WSNs with three main parameters

Approach	Scalability	Energy-efficient	Data storage/lookup efficiency
GHT(WSNs)	+	+	++
CSN(WSNs)	+	0/+	++
T-DHT(WSNs)	++	--	+
CHR(Ad-hoc)	+	n/a	n/a
VRR(WSNs)	+	+	++
ScatterPastry (WSNs)	+++	+++	+++

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