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K-Nearest Neighbour Algorithm for Moving Taps to Create a Signal Network

[1]Vipin V. Gulghane, [2]Prof. Ashish Manusmare,
BIT, Ballarpur
Assistant Professor, BIT, Ballarpur

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ABSTRACT:The Algorithms (KNNs) are technology that uses moving taps as nodes in a network to create a signal network. KNN turns every participating tap into a wireless router, allowing taps of each other to connect and create a network with a wide range. KNNs are developed for enhancing the driving safety and comfort of automotive users. The KNNs can provide wide variety of services such as Intelligent Flow System (ILS) e.g. safety applications. Many of safety applications built in KNNs are required real-time communication with high reliability. One of the main challenges is to avoid degradation of communication channels in dense flow network.The main objective of this synopsis is working based Data control for KNN.

- Design a model using master and slave sensor nodes.
- Transmission of data packet from node to node based on working.
- Comparing the result in terms of data transfer with earlier work.

KEYWORDS:KNN (K-Nearest Neighbour), ILS (Intelligent Flow System)

I. INTRODUCTION

K-Nearest Neighbor (KNN) Algorithm is a technology that uses moving taps as nodes in a network to create a signal network. KNN turns every participating tap into a wireless router or node, allowing taps approximately 100 to 300 meters of each other to connect and, in turn, create a network with a wide range. As taps fall out of the signal range and drop out of the network, other taps can join in, connecting flows to one another so that a signal Internet is created. It is estimated that the first systems that will integrate this technology are police and fire flows to communicate with each other for safety purposes.

KNN plays an important role in future tap-to-tap communication systems and related applications like self-organizing flow information systems (SOFIS), which are based on bPipecast transmission schemes. Data control for KNNs has not been studied thoroughly so far - but this feature is extremely necessary for KNN applications and network performance. Due to the high mobility and the resulting highly dynamic network topology, Data control needs to be performed in a decentralized and self-organized way, locally in each KNN node.

KNN is the technology of building a robust Ad-Hoc network between signal flows and each other, besides, between signal flows and Pipeside units. As shown in Fig. 1, there are two types of nodes in KNNs signal nodes as On Board Units (OBUs) and static nodes as Pipe Side Units (RSUs). An OBU resembles the signal network module and a central processing unit for on-board sensors and warning devices. The RSUs can be mounted in centralized locations such as intersections, parking lots or gas stations. They can play a significant role in many applications such as a gate to the Internet. KNN presents a new and promising field of research, development and standardization. Accordingly, flow manufacturers are competing in equipping their flows with devices that collect data from the interior and exterior of flows and deliver it to a central processing unit that can analyze this data to boost the Pipe safety while increasing the on-board luxury. Global positioning systems (GPS), Event Data Record (EDR) resembling the Black-Box used in avionics, small range radars, night vision, light sensors, rain sensors and navigation systems are well-known intelligent devices used in many newly produced flows, what is rather referred to as "Computers-on-Wheels".Communication researchers have been recently working on a prominent step if each flow has a device that can communicate with other flows, flows will have a gigantic new source of information that extends beyond the capabilities of all previously mentioned devices. For example, all of these devices cannot warn the driver of a stopping flow in the next turn and of course cannot let flowers enjoy video chatting and file sharing at no charge. Moreover, with this technology, flows can talk to each other and inform each other of any probable danger and may even respond to that danger in a cooperative manner, i.e. introducing what may be rather referred to as "Computer Networks-on-Wheels".Under heavy industrial pressure, it is obvious that KNNs are likely to become the most relevant realization of signal Ad-Hoc networks. Motivations of the promising KNN technology include, but are not limited to, increased flower safety, enhanced flower mobility, decreased flowing time, conservation of energy, protecting the environment, magnified flow system efficiency and boosted on-board luxury.Related governmental authorities are expected to set a number of new rules and regulations forcing all flow manufacturers to equip their flows with KNN transceivers employing some of the required safety applications.

Data Control

Data is an important issue that can arise in packet switched network. Data is a situation in Communication Networks in which too many packets are present in a part of the subnet, performance degrades. Data in a network may occur when the load on the network (i.e. the number of packets sent to the network) is greater than the capacity of the network (i.e. the number of packets a network can handle.) In other words when too much flow is offered, Data sets in and performance degrades sharply. Data occurs when too many sources are sending too much of data for network to handle. Data in a wireless sensor network can cause missing packets, low energy efficiency and long delay.

Various causes of Data are as follows:-

1. The input flow rate exceeds the capacity of the output lines. If suddenly, a stream of packet start arriving on three or four input lines and all need the same output line. In this case, a queue will be built up. If there is insufficient memory to hold all the packets, the packet will be lost. Increasing the memory to unlimited size does not solve the problem. This is because, by the time packets reach front of the queue, they have already timed out (as they waited the queue). When timer goes off source transmits duplicate packet that are also added to the queue. Thus same packets are added again and again, increasing the load all the way to the destination.
2. The routers are too slow to perform bookkeeping tasks (queuing buffers, updating tables, etc.).
3. The routers' buffer is too limited.
4. Data in a subnet can occur if the processors are slow. Slow speed CPU at routers will perform the routine tasks such as queuing buffers, updating table etc slowly. As a result of this, queues are built up even though there is excess line capacity.
5. Data is also caused by slow links.

This problem will be solved when high speed links are used. But it is not always the case. Sometimes increase in link bandwidth can further deteriorate the Data problem as higher speed links may make the network more unbalanced. Data can make itself worse. If a route does not have free buffers, it starts ignoring /distapding the newly arriving packets. When these packets are distapded, the sender may retransmit them after the timer goes off. Such packets are transmitted by the sender again and again until the source gets the acknowledgement of these packets. Therefore multiple transmissions of packets will force the Data to take place at the sending end.

II. LITERATURE RIVIEW

Data occurs when too many sources are sending too much of data for network to handle. Data in a wireless sensor network can cause missing packets, low energy efficiency and long delay. A sensor node may have multiple sensors like light, temperature etc. with different transmission characteristics has different characteristics and requirements in terms of transmission rate, bandwidth, delay, and packet loss. Different types of data generated in heterogeneous wireless sensor networks have different priorities. In multi path wireless sensor networks, the data flow is forwarded in multiple paths to the sink node. It is very important to achieve weighted fairness for many WSN applications. In this paper they propose a working based Data control for heterogeneous each application flow in multi path wireless sensor network. [1]

Heterogeneous applications could be assimilated within the same wireless sensor network with the aid of modern motes that have multiple sensor boards on a single radio board. Different types of data generated from such types of motes might have different transmission characteristics in terms of working, transmission rate, required bandwidth, tolerable packet loss, delay demands etc. Considering a sensor network consisting of such multi-purpose nodes, this paper proposes Prioritized Heterogeneous Flow-oriented Data Control Protocol (PHTCCP) which ensures efficient rate control for prioritized heterogeneous

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flow. This protocol uses intra-queue and inter-queue priorities for ensuring feasible transmission rates of heterogeneous data. It also guarantees efficient link utilization by using dynamic transmission rate adjustment. Detailed analysis and simulation results are presented along with the description of our protocol to demonstrate its effectiveness in handling prioritized heterogeneous flow in wireless sensor networks. [2]

III. PROBLEM DEFINITION

Based on the above discussion it is clear that a Data occurring during the data transfer in a particular network causing a packet loss and long delay. Hence, we are trying to improvise this on using working based technique and control the Data based on working.

IV. RESEARCH METHODOLOGY

System Model

This project addresses upstream Data control for a WSN that supports single-path routing. In Fig. 1, sensor nodes generate continuous data and form many-to-one convergent flow in the upstream direction. They are assumed to implement SERIAL-like KNN protocol. Each sensor node could have two types of flow: source and transit. The former is locally generated at each sensor node, while the latter is from other nodes. Therefore, each sensor node can be a source node and/or intermediate node. When a sensor node has offspring nodes and transit, it is a source node as well as an intermediate node. On the other hand, it is only a source node if it has no offspring nodes, and therefore only has source flow. The offspring node of a particular node is defined as the node whose flow is routed through this particular parent node. If an offspring node directly connects to its parent node, this offspring node is called child node and its parent node is called parent node.

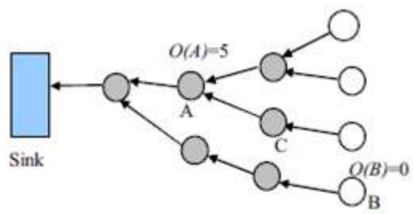

Figure 1: Network Modeling

For example, in Fig.G1, node A has 5 offspring nodes and therefore it plays the role of a source node as well as an intermediate node, simultaneously. Node C is the child node of node A, which in turn is the parent node of node C. However, node B has zero offspring node and is only a source node. For a particular sensor node i, we use O(i) to denote the total number of its offspring nodes. When we refer to sensor nodes, we mean that they act as both a source node and an intermediate node unless otherwise indicated.

Node Model

Fig: 2 above presents the queuing model at a particular sensor node iwith single-path routing. The transit flow of node i(irtr) is received from its child nodes such as node i 1 through its KNN layer. The source flow is locally generated with the rate of rsirc. Both the transit flow and the source flow converge at the network layer before being forwarded to node i+ 1,
which is the parent node of node i.

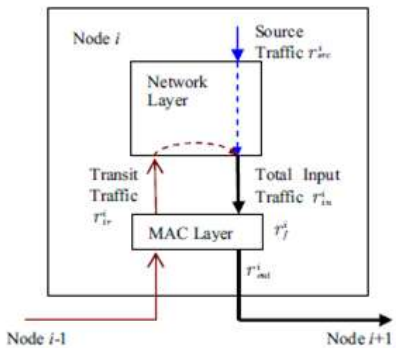

Figure 2: General Node Model

Packets could be queued at the KNN layer if total input flow rate (r iin= rsirc+ rtir) exceeds packet forwarding rate at the KNN layer (irf). The packet forwarding rate Irfdepends on the KNN protocol itself. With the assumption of SERIAL-like protocol, the number of active sensor nodes as well as their flow density influences irf. In Fig. above, iroutis the packet rate at the node itowards node i+ 1. If irinis smaller than irf, rout will equal irin. Otherwise if irin>irf, then iroutwill be close to irf. Therefore, min(i, i)irout= rin r f .This property can be utilized to indirectly reduce iroutthrough reducing irin. In fact, the output flow at node iis part of transit flow at the node i+ 1. Therefore reduction of iroutimplies a decrease of irtr+ . If packet input rate irinexceeds packet forwarding rate irf, then there will be backlogged packets inside node iand node-level Data takes place. At this time, we need to reduce irinand/or increase irf. While irfcan be increased through adjusting KNN protocols, it is much easier to lower irinthrough throttling either is r , irtror both of them. The source rate rsirccan be reduced locally by changing sampling (or reporting) frequency. The transit flow Irtrcan be indirectly reduced through rate adjustment at the node i+ 1 . On the other hand, if there is collision on the link around the node i, then node iand its neighboring nodes should reduce channel access in order to prevent further link-level Data. Although this task may be performed through KNN, yet it is easier to reduce irin. This project designs a novel Data control approach through flexible and distributed rate adjustment in each senor node as shown in fig above. It introduces a scheduler between network layer and KNN layer, which maintains two queues: one for source flow and another for transit flow. The scheduling rate is denoted as rsivc. A Weighted Queuing (WQ) algorithm can be used to guarantee fairness between source and transit flow, as well as among all sensor nodes. The working index of source flow and transit flow, which will be defined in next section, is used as the weight, respectively, for source flow queue and transit flow queue. By adjusting the scheduling rate rsivc, LEAKAGE FINDING realizes an efficient Data control while maintaining the KNN protocol parameters unchanged and therefore works well with any SERIAL like KNN protocol.

Generating the LEAKAGE FINDING

LEAKAGE FINDING is designed with such motivations:

1) In WSNs, sensor nodes might have different working due to their function or location. Therefore, Data control protocols need guarantee weighted fairness so that the sink can get different, but in a weighted fair way, throughput from sensor nodes.

2) Data control protocols need to improve energy-efficient and support traditional QoS in terms of packet delivery latency, throughput and packet loss ratio.

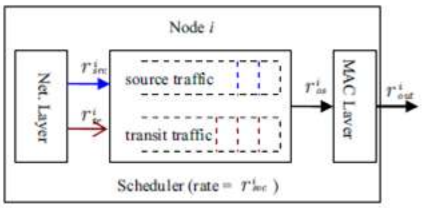

Figure 3: Node Model in Leakage Finding

LEAKAGE FINDING tries to avoid/reduce packet loss while guaranteeing weighted fairness and supporting multipath sensing with lower control overhead. LEAKAGE FINDING consists of three components: intelligent Data detection (ICD), implicit Data notification (ICN), and working-based rate adjustment (PRA). ICD detects Data based on packet inter-arrival time and packet service time. The joint participation of inter-arrival and service times reflect the current Data level and therefore provide helpful and rich Data information. To the best of our knowledge, jointly use of packet inter-arrival and packet service times as in ICD to measure Data in WSNs has not been done in the past. LEAKAGE FINDING uses implicit Data notification to avoid transmission of additional control messages and therefore help improve energy-efficiency. In ICN, Data information is piggybacked in the header of data packets. Taking advantage of the bPipecast nature of wireless channel, child nodes can capture such information when packets are forwarded by their parent nodes towards the sink. Finally, LEAKAGE FINDING designs a novel working-base rate adjustment algorithm (PRA) employed in each sensor node in order to guarantee both flexible fairness and throughput, where each sensor node is given a working index. PRA is designed to guarantee that:

1. The node with higher working index gets more bandwidth.
2. The nodes with the same working index get equal bandwidth.
3. A node with sufficient flow gets more bandwidth than one that generates less flow.

The use of working index provides LEAKAGE FINDING with high flexibility in weighted fairness. For example, if the sink wants to receive the same number of packets from each sensor node, the same working index can be set for all nodes. On the other hand, if the sink wants to receive more detailed sensory data from a particular set of sensor nodes, such sensor nodes can be assigned a higher working index and therefore allocated higher bandwidth.

V. CONCLUSION

LEAKAGE FINDING is a hop-by-hop upstream Data control protocol for KNN. From the research we can say that it has following properties:

1. Uses packet inter-arrival and service times to accurately measure Data at each sensor node;
2. Introduces node working index and realizes weighted fairness.

Therefore LEAKAGE FINDING is energy efficient and provides lower delay. It is also feasible in terms of memory requirements considering the configurations of today's multi-purpose motes. Thus in future this work can be greatly useful on integrating end-to-end reliability mechanism and further improvement in fairness for LEAKAGE FINDING.

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