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An Efficient Data Assortment using Hybrid Approach for Large Scale Mobile Monitoring Applications

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Abstract:
Wireless sensor networks are used for ambient data collection in diverse environments where Energy consumption becomes a primary concern. In this succinct, A hybrid RFID and WSN system (HRW) that integrates the traditional RFID system and WSN system for efficient data collection. HRW has hybrid smart nodes that combine the function of RFID tags, the reduced function of RFID readers, and wireless sensors. Therefore, nodes can read each other's sensed data in tags, and all data can be quickly transmitted to an RFID reader through the node that first reaches it. The RFID readers transmit the collected data to the back-end servers for data processing and management. It is used to improve efficiency, cost of deployment, transmission delay and capability, and tag capacity requirement.

Index Terms – Radio frequency identification (RFID); wireless sensor networks (WSNs); distributed hash tables (DHTs); data routing

1. INTRODUCTION

Wireless ad hoc networks have long been proposed to enable communication in the absence of any infrastructure terminals, effectively infrastructure offering a truly mobile experience to the users. Due to their broad applicability in various settings (including Sensor and vehicular networks), a plethora of data forwarding/ dissemination strategies have been conceived to meet the needs of the various different services envisioned. However, while highly efficient communication strategies have been designed for popular networking scenarios (with sensor networks being the prevalent example) little work has been documented for the study of ad hoc networks to support public safety solutions. Noticeably, unlike traditional ad hoc networks where each source node knows apriority the set of destination nodes to whom to deliver data to, in emergency response networks such an assumption is not valid. The traditional problems of routing and congestion control must now be jointly optimized with control of and allocation rate at the physical layer. Moreover, the inherent distributed behavior of wireless networks dictates that distributed network algorithms requiring less communication overhead can be developed to implement the optimization.

Wireless sensor networks (WSNs) have emerged as a new information-gathering paradigm in a wide range of applications, such as medical treatment, outer-space exploration, battlefield surveillance, emergency response, etc. Propose a new data-gathering mechanism for large-scale wireless sensor networks by introducing mobility into the network. A mobile data collector, for convenience called an M-collector in this paper, could be a mobile robot or a vehicle equipped with a powerful transceiver and battery, working like a mobile base station and gathering data while moving through the field. An M-collector starts the data-gathering tour periodically from the static data sink, polls each sensor while traversing its transmission range, then directly collects data from the sensor in single-hop communications, and finally transports the data to the static sink. Since data packets are directly gathered without

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relays and collisions, the lifetime of sensors is expected to be prolonged.

Frequency Identification (RFID) and wireless sensor networks (WSNs) are two of the most important systems widely used in many monitoring applications such as environmental and health monitoring and enterprise supply chains. WSNs are mainly used for monitoring physical or environmental condition, collecting environmental data such as temperature, sound. RFID is a technology that uses radio waves to transfer data between RFID tags and RFID readers (readers in short). RFID can be implemented on the objects to be identified, improving the efficiency of individual object tracking and management. RFID tag data usually is collected using direct transmission mode, in which an RFID reader communicates with a tag only when the tag moves into its transmission range. If many tags move to a reader at the same time, they will contend to access the channels for information transmission. To overcome this problem, we can implemented a HRW. It has low economic cost, high performance and real-time individual monitoring in large-scale mobile monitoring applications.

2. RELATED WORK

HYBRID SMART NODES

2.1. Reduced-function sensor

Unlike the normal sensors, this sensor does not have transmission function. It collects the environmental data and the sensed data (e.g., pressure, temperature) from hosts.

2.2. RFID tag

As the normal RFID tags, it serves as traditional packet memory buffer for information storage. The RFID information such as identity and properties is configured into the RFID tag during the production stage.

2.3. Reduced-function RFID reader (RFRR)

It is used for the data transmission between smart nodes. A smart node uses RFRR to read other smart nodes' tags and write the information into its own tag.

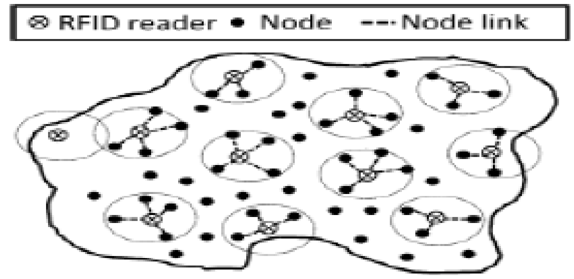

Fig. 1. Traditional RFID architecture

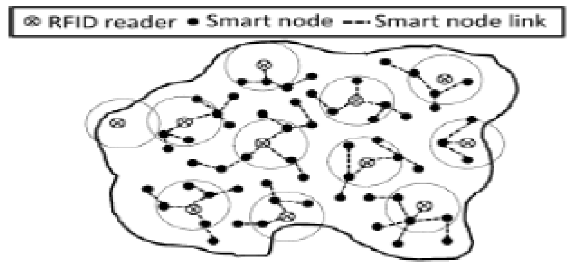

Fig. 2. HRW architecture.

Fig. 1 shows the traditional RFID architecture, and Fig. 2 shows the architecture of the HRW system. Both architectures are hierarchical. The upper layer is composed of RFID readers connected to the back-end infrastructure with high-speed backbone cables. The back-end infrastructure connects to the applications (e.g., database in a hospital). The lower layer is formed by a considerable number of object hosts that transmit data to RFID readers. The difference between these two architectures is the transmission mode.

In Fig. 1, only the nodes (hosts) in the transmission range of RFID readers can send their tag information to the RFID readers. As explained in Section 1, this direct transmission mode would lead to channel contention and hence low successful transmission rate and slow data collection. In Fig. 2, the nodes are smart nodes that can exchange and replicate tag information with each other using wireless RF channels. Each RFID reader reads tags within its transmission range. Since the data can be transmitted to the RFID reader using a multi-hop transmission mode, each RFID reader can also receive the information in tags outside of its transmission range. In this way, HRW can quickly collect data and expedite the data collection. After smart node A collects the sensed data, it appends the sensed data with a timestamp and stores the data in its tag through RFRR. When node i replicates node j's data, node i also records the timestamp of the replication time denoted by tij.

It roams over a sensing filed, "transports" data while moving, or pauses at some anchor points on its moving path to collect data from sensors via short-range communications. Energy consumption at sensors can be greatly reduced, since the mobility of the collector effectively dampens the relay hops of each packet. To pursue the maximum energy saving, the mobile collector should traverse the transmission range of each sensor in the field so that each packet can be transmitted to the mobile collector in a single hop. Due to the low velocity of the mobile collector, it would incur long latency in data gathering, which may not meet the delay requirements of time-sensitive applications. In order to shorten data gathering latency, it is necessary to incorporate multi-hop relay into mobile data gathering, while the relay hop count should be constrained to certain level to limit the energy consumption at sensors. Polling based approach pursues a tradeoff between the energy saving and data gathering latency. It achieves the balance between the relay hop count for local aggregation and the moving tour length of the mobile collector. A subset of sensor will be selected as the polling points (PPs), each aggregating the local data from its affiliated sensors within a certain number of relay hops. These PPs will temporarily cache the data an upload them to the mobile collector when it arrives. the mobile collector. A subset of sensor will be selected as the polling points (PPs), each aggregating the local data from its affiliated sensors within a certain number of relay hops. These PPs will temporarily cache the data an upload them to the mobile collector when it arrives.

3. IMPLEMENTATION

Mobile sensor networks are the spatially scattered sensor nodes which are mobile. Mobile sensor networks are generally the sensor nodes consist of a radio transceiver and a microcontroller which is powered by a battery. One of the greatest challenges is routing data from its source to the destination is no fixed topology in mobile sensor networks. Usually routing protocols are in two fields; that are WSNs and mobile ad hoc networks (MANETs). WSN routing protocols cannot handle the high frequency of topology changes. As MANET routing protocols are can deal with mobility in the sensor network but they are designed for two way communication, which in sensor networks is frequently not required. MANET protocols such as Ad hoc On-Demand Distance Vector Routing (AODV), Dynamic Source Routing (DSR) and Greedy Perimeter Stateless Routing (GPSR) are borrowed since there is no standard protocol for WMSNs. The advantage of allowing the sensors to be mobile increases the number of applications beyond those for which static WSNs are used. Mobile sensors are used for the environment monitoring, health monitoring for elderly people and to track animals.

3.1 CLUSTER-BASED DATA TRANSMISSION

In this mode, we describe two enhanced algorithms called cluster-member based and cluster-head algorithms, in which smart nodes are clustered to different virtual clusters and each cluster has a cluster head. In the cluster-member based algorithm, cluster members replicate their tag data between each other. When a cluster member of a virtual cluster enters the reading range of an RFID reader, by reading the aggregated tag information from the cluster member, the RFID reader receives all information of nodes in this virtual cluster. In the cluster head based algorithm, cluster members replicate their tag data to the cluster head. When a cluster head of a virtual cluster reaches an RFID reader, the

RFID reader receives all information of nodes in this virtual cluster. This enhanced method greatly reduces channel access congestion, reduces the information exchanges between nodes and makes it easy to erase duplicate information in a cluster. The method is suitable to the applications where monitored objects (e.g., zebras, birds, and people) tend to move in clusters.

3.2 COMMUNICATION SECURITY MECHANISMS

The multi-hop message transmission mode in HRW improves the communication efficiency. However, such method introduces privacy and security risks. Low-cost RFID nodes are not tamper-resistant and deployed in open environment, thus the attackers can easily physically access and take control of these nodes. The attacker can obtain all the information in the compromised nodes and use the compromised nodes to obtain sensitive information and disrupt system functions. Thus, in this section, we consider two security threats arising from node compromise attacks: data manipulation and data selective forwarding.

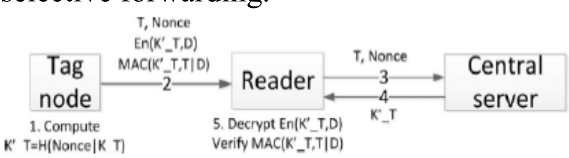

Fig 4 Procedure for secure data reading and verification.

3.3 DATA PRIVACY AND MANIPULATION

When a reader receives the data, it first sends to the central server the tag ID N and N once. The server finds KN and computes the temporary key K0N, and then securely sends K0N to the reader. After receiving K0N, the reader is able to decrypt the data DN from EnðK0N; DNÞ and then verifies whether MAC is correct. If the recomputed MAC is consistent with the MAC received from the smart node, the reader considers the MAC is correct and the data set is authentic. Otherwise, the EnðK0N; DNÞ is changed by an adversary node.

Due to the nodal mobility, the connectivity between two nodes in mobile sensor networks is intermittent. Efficient delivery of packets requires reliable connection between the sender and the receiver. Seughun Cha et al. proposed a delivery scheme for intermittent mobile sensor networks with an optimal delaying technique. The connectivity is the probability to get the packet from one node to another. The packet transmission takes place only when the connectivity is above threshold. Otherwise it delays the transmission and then the packet forwarding. Here the threshold is given by the application. This method has efficient packet delivery and less packet delivery cost.To avoid being detected for changing data, an adversary may launch old message replay attack by replacing a new message from a node with an old message from the node. When a reader forwards the N and Nonce to the central server, the central server can easily detect outdated nonce values which were reported previously. As a result, the old message replay attack can be detected.
In the cluster-head based transmission algorithm, the cluster head in each cluster is responsible for forwarding the tag data of all cluster members to the reader. A malicious cluster head can drop part of the data and selectively forward the gathered information to the reader. Since an RFID reader may not know all the smart nodes in a head's cluster in advance, it cannot detect such attacks.To prevent the selective forwarding attack, we can exploit the cluster-member based data transmission algorithm, in which all cluster members hold the data of all other nodes in the cluster. A reader can compare cluster members' reported data with the cluster head's reported data to verify the correctness of the latter.

4. CONCLUSION

The data gathering scheme proposed in the paper minimizes delay in wireless sensor network by reducing the relay hop count of sensors for local data aggregation and the tour length of the mobile collector. Hybrid RFID and WSN System(HRW) that integrates the multi-hop transmission mode of WSNs and direction transmission mode of RFID systems to improve the efficiency of data collection, hence to meet the requirements of low economic cost, high performance and real-time monitoring in mobile monitoring applications. HRW is composed of RFID readers and hybrid smart nodes. Extensive simulation and trace driven experimental results show that HRW outperforms traditional RFID in terms of the cost of deployment, transmission capacity and delay and tag capacity requirement. It has to be evaluate HRW in a real world tested with more securing mechanisms.

REFERENCES:

[1] W.C. Cheng, C. Chou, L. Golubchik, S. Khuller, and Y.C. Wan,"A Coordinated Data Collection Approach: Design, Evaluation, and Comparison," IEEE J. Selected Areas in Comm., vol. 22, no. 10, pp. 2004-2018, Dec. 2004.

[2] A. Manjeshwar and D.P. Agrawal, "Teen: A Routing Protocol for Enhanced Efficiency in Wireless Sensor Networks," Proc. IEEE Int'l Parallel and Distributed Processing Symp., Apr. 2001.

[3] A. Scaglione and S.D. Servetto, "On the Interdependence of Routing and Data Compression in Multi-Hop Sensor Networks," Proc. ACM MobiCom, 2002.

[4] X. Tang and J. Xu, "Adaptive Data Collection Strategies for Lifetime-Constrained Wireless Sensor Networks," IEEE Trans. Parallel and Distributed Systems, vol. 19, no. 6, pp. 721-734, June 2008.

[5] F. Ye, G. Zhong, S. Lu, L. Zhang, GRAdient broadcast: a robust data delivery protocol for large-scale sensor networks, Wireless Networks 11 (3) (2005) 285–298.

[6] W. Wu, H.B. Lim, K.L. Tan, Query-driven data collection and data forwarding in Intermittently Connected Mobile Sensor Network, in: Proceedings of the Seventh International Workshop on Data Management for Sensor Networks (DMSN'10), 2010, pp. 20–25.

[7] L. Su, C. Liu, H. Song, G. Cao, Routing in Intermittently Connected Sensor Networks, in: Proceedings of the 16th IEEE International Conference on Network Protocols, October 19–22, Orlando, Florida, 2008.Bologna, 2008, pp. 171–188.

[8] Seunghun Cha, Elmurod Talipov, Hojung Cha , Data delivery scheme for intermittently connected mobile sensor Networks , Computer Communications 36 (2013) 504–519

[9] Jinxia Liu, Naijie GU, Songsong He,"An Energy-Aware Coverage Based Node Scheduling Scheme for Wireless Sensor Networks", The 9th International Conference for Young Computer Scientists.

[10] Shiow-Fen Hwang, Yi-Yu Su, Yi-Yo Lin, Chi-Ren Dow,"A Cluster-Based Coverage-Preserved Node Scheduling Scheme in Wireless Sensor Networks", 0-7803-9792-4/06/$20 .00 C2006 IEEE.

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