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Review Discussion of communication differences between Remote Sensor Network and wireless Ad Hoc Networks

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Abstract— **Wireless devices have lower bandwidth and wireless devices are mobile and therefore the topology of the network changes rather frequently. As consequences, algorithms for wireless and mobile networks should have: little communication as possible and should run as fast as possible. Both goals can only be achieved by developing algorithms requiring a small number of communication rounds only. Given an aggregation tree and query workload, find an energy-efficient result propagation scheme in-network processing. Sensor network is power (and bandwidth) constrained local computation is much cheaper than communication. In this paper, we present a survey on localization methods for mobile wireless sensor networks. We discussed taxonomies for mobile wireless sensors and localization, including common architectures, measurement techniques, communication differences and security issues.**

Index Terms*— *MANET, WSN, SECURITY, APPS, Ad hoc, Sensor Networks.

I. INTRODUCTION

Usually contain thousands or millions of sensors, which are randomly and widely deployed [1]. Wireless sensor networks (WSNs) do not always have sensor nodes of same type. In other words, WSNs are not always homogeneous, but some sensor nodes of higher energy can be used to prolong the lifetime and reliability of WSNs. Heterogeneous wireless sensor networks (HWSNs) have some sensor nodes of relatively higher energy [2]. A wireless sensor network (WSN) extends our capability to explore, monitor and control the physical world. It is especially useful in catastrophic or emergency scenario where human participation may be too dangerous. The sensor networks have evolved over a period of time. The failures are inevitable in wireless sensor networks due to inhospitable environment and unattended deployment; therefore sensor nodes must operate potentially in large numbers. The latest generation of sensors encompasses self-organizing, flexible and scalable networks [3].Wireless sensor net-works have at least one base station that works as a gateway between the sensor network and outside world. Sensor nodes sense the phenomenon and send the data to base station via single or multi-hop communication. Users access the data store database station [4]. An ad hoc network is a wireless decentralized structure network comprised of nodes, which autonomously set up a network. No external network infrastructure is necessary to transmit data – there is no central administration. Freely located network nodes participate in transmission. Network nodes can travel in space as time passes, while direct communication between each pair of nodes is usually not possible. Generally, ad hoc network can consist of different types of multi-functional computation devices. A mobile ad-hoc network (MANET) is a self-configuring infrastructure-less network of mobile devices connected by wireless. *Ad hoc* is Latin and means "for this purpose". Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. MANETs are a kind of wireless ad hoc networks that usually has a routable networking environment on top of a Link Layer ad hoc network [3].

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II. RELATED WORK

In a wireless sensor network, wireless transmission consists of three major operations:

- Convert data into radio waves.
- Amplify radio waves until reaching the receiving sensors.
- Receiving sensors receive data.

The amount of energy consumed in each of the three operations is proportional to the transmitted data amount. Furthermore, the amount of energy consumed in operation is inversely proportional to the square of the distance between two communicating sensors. Both of them imply energy consumption can be effectively reduced by shortening the transmission distance and reducing the transmitted data amount [4].In order to minimize the energy consumption in WSNs, several energy-efficient MAC protocols and energy-efficient routing protocols [4, 5] have been proposed in the literature. These proto-cols aim at decreasing the energy consumption by using sleep schedules. Significant energy saving is achieved by such schemes; however the WSN keeps always sending redundant data. Typically, WSNs rely on the cooperative effort of the densely deployed sensor nodes to report detected events. As a result, multiple sensor nodes may report the same event. To further decrease energy consumption, several works are now focusing on the elimination of redundant information. The reduction of the number of redundant packets can be achieved either at the data originator level (i.e., sensor nodes that detect the event) by limiting the reporting task to a small subset of sensor nodes, or at the intermediate sensor nodes routing the information to the sink by means of aggregation mechanisms [4]. The Mobiware effort [6] has created an open and active programmable mobile test bed for experimenting with mobile and wireless networking. In the Mobiware test bed CORBA issued to signal handoffs of Wave LAN-equipped mobile end systems connected to an IP-over-ATM wired network. The Mobiware work does not explicitly tackle the QoS maintenance problem; that is; the pre-allocation approaches discussed earlier are not applied, so when a handoff occurs there is no guarantee that QoS will be maintained. However, the Mobiware work does tackle the resource change problem. If available resources change (either because of a hand off between cells or because of transmission quality changes within a cell), there is a mechanism for dealing with this change. Application adaptation to varying QoS in the experiments described in was performed by passing the application flows, which consisted of hierarchically encoded video streams, through a filter deployed at the access point. The filter will drop or add layers containing more or less of the video flow in response to changing QoS. We should also note that the Mobiware work appears to be extremely general; the mechanism described above is just one approach that could be implemented in the Mobiware test bed [7].

III. Area Monitoring

Area monitoring is a common application of WSNs. In area monitoring, the WSN is deployed over a region where some phenomenon is to be monitored. A military example is the use of sensors detects enemy intrusion; a civilian example is the geo-fencing of gas or oil pipelines [3].

IV. Environmental/Earth Monitoring

The term Environmental Sensor Networks, has evolved to cover many applications of WSNs to earth science research. This includes sensing volcanoes, oceans, glaciers, forests, etc. Some of the major areas are listed below.

A. Air Pollution Monitoring

Wireless sensor networks have been deployed in several cities (Stockholm, London or Brisbane) to monitor the concentration of dangerous gases for citizens. These can take advantage of the ad-hoc wireless links rather than wired installations, which also make them more mobile for testing readings in different areas. There are various architectures that can be used for such applications as well as different kinds of data analysis and data mining that can be conducted.

B. Forest Fire Detection

A network of Sensor Nodes can be installed in a forest to detect when a fire has started. The nodes can be equipped with sensors to measure temperature, humidity and gases which are produced by fire in the trees or vegetation. The early detection is crucial for a successful action of the firefighters; thanks to Wireless Sensor Networks, the fire brigade will be able to know when a fire is started and how it is spreading [6].

C. Landslide Detection

A landslide detection system makes use of a wireless sensor network to detect the slight movements of soil and changes in various parameters that may occur before or during a landslide. Through the data gathered it may be possible to know the occurrence of landslides long before it actually happens.

D. Water Quality Monitoring

Water quality monitoring involves analyzing water properties in dams, rivers, lakes & oceans, as well as underground water reserves. The use of many wireless distributed sensors enables the creation of a more accurate map of the water status, and allows the permanent deployment of monitoring stations in locations of difficult access, without the need of manual data retrieval.

E. Disaster Prevention

Wireless sensor networks can effectively act to prevent the consequences of natural disasters, like floods. Wireless nodes have successfully been deployed in rivers where changes of the water levels have to be monitored in real time.

F. Machine Health Monitoring Industry

Wireless sensor networks have been developed for machinery condition-based maintenance (CBM) as they offer significant cost savings and enable new functionalities. In wired systems, the installation of enough sensors is often limited by the cost of wiring. Previously inaccessible locations, rotating machinery, hazardous or restricted areas, and mobile assets can now be reached with wireless sensors.

G. Data Logging

Wireless sensor networks are also used for the collection of data for monitoring of environmental information; this can be as simple as the monitoring of the temperature in a fridge to the level of water in overflow tanks in nuclear power plants. The statistical information can then be used to show how systems have been working. The advantage of WSNs over conventional loggers is the "live" data feed that is possible.

H. Industrial Sense and Control Applications

In recent research a vast number of wireless sensor network communication protocols have been developed. While previous research was primarily focused on power awareness, more recent research have begun to consider a wider range of aspects, such as wireless link reliability, real-time capabilities, or quality-of-service. These new aspects are considered as an enabler for future applications in industrial and related wireless sense and control applications, and partially replacing or enhancing conventional wire-based networks by WSN techniques.

I. Greenhouses

Wireless sensor networks are also used to control the temperature and humidity levels inside commercial greenhouses. When the temperature and humidity drops below specific levels, the greenhouse manager must be notified via e-mail or cell phone text message, or host systems can trigger misting systems, open vents, turn on fans, or control a wide variety of system responses. Recent research in wireless sensor networks in agriculture industry give emphasis on its use in greenhouses, particularly for big exploitations with definite crops. Such microclimatic ambiances need to preserve accurate weather status at all times. Moreover, using multiple distributed sensors will better control the above process, in open surface as well as in the soil.

V. DIFFERENCES FROM MOBILE AD HOC NETWORKS

We studied mobile ad hoc networks (MANETs), which are also made up of a number of wireless, mobile nodes. However, there are significant differences between MANETs and WSNs. These are as follows:

- The number of sensor nodes in a sensor network is much more than that in an ad hoc network. Usually sensor networks consist of 1,000 to 10,000 sensor nodes covering the area.
- Sensor nodes are generally static and cooperate together to transfer the sensed data.
- In mobile ad hoc networks, the number of nodes is much less, but their mobility is very high.
- Sensor nodes mainly use the broadcast communication paradigm, whereas most ad hoc networks are based on point-to-point communication.

Another difference between the two is that sensor nodes have a much lower power consumption requirement, of the order of 0.75mW.

VI. SECURITY ISSUES IN MOBILE COMPUTING

No book on mobile computing can be considered complete without a discussion on security. Since mobile computing systems are based on wireless networks and wireless communication technologies, the security of such systems is a major concern. We have already mentioned earlier that larger security challenges are present in wireless networks than in conventional wired networks. Security becomes mandatory in mobile systems due to the existence of hackers, viruses, intruders and Internet-based attackers, who have easy access to such systems through the broadcast nature of wireless channels. Much of the security problem in wireless networks can be traced to the base stations or access points (APs), which operate without any security at all and can be easily taken out and put into wired (Ethernet) nets, exposing the data on it to everyone within its radio range. It is worth mentioning here that the dissimilarities between wired and wireless networks make it difficult to implement the existing firewalls and other intrusion detection systems (IDS) of wired networks in wireless networks. The most significant difference is that data in a wireless network are transmitted over the broadcast medium, rendering it available to all nodes in the vicinity. Another major difference lies in the communication link, which is slower and of lower bandwidth. Limited battery constraints and higher costs are also major drawbacks in mobile, portable systems [6,7].

VII. DEVELOPMENT WORK IN WSN

We give some details of each of these below. In the work entitled 'Dynamic Keying in Tinysec: development of Security Architecture for Wireless Sensor Networks', a new security architecture has been proposed for WSNs. The existing TinySec algorithm has been modified to incorporate the feature of a dynamically changing key. The proposed algorithm does intrusion detection and provides security against DOS (denial of service) attacks. TinyOS 1.0 has also been modified, and the required modules and interfaces have been added for implementing dynamic key change [6,7].

VIII. COMPARING MANETS AND WSNS

Below Table.1 shows the difference between MANET and Wireless Sensor Network communication differences with respect to some important parameters.

TABLE 1: DIFFERENTIATE BETWEEN MANETS&WSNS

Parameter	Mobile Ad hoc Networks (MANETs)	Wireless Sensor Networks (WSNs)
No. of Nodes	Small to moderate	Large (>100)
Batteries	Replaceable and/or Rechargeable	Often irreplaceable
Redundancy	Low	High
Data Rate	High	Low

IX. CONCLUSION

In this report we have discussed the basic understanding and aspects of wireless sensor network and MANET. We have also have compared the characteristics of the aforementioned. One of the important conclusions is that while these two routing protocols show quite a stable performance for different scenarios and is in huge use in current technical fields and are also under further development. We conclude with a description of real-world mobile sensor applications that require position estimation.

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