International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2017 IJSRCSEIT | Volume 2 | Issue 2 | ISSN : 2456-3307

Investigation of Communication Sensing schemes for secure data transfer in IoT environment

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ABSTRACT

In recent years, an IoT is the part of things because of its individuality providing connection and communication among a variety of physical objects and devices enabling collection of miscellaneous data that help making smart and educated decisions, which in turn help making human life simple, safe and efficient. Billions of things are expected to be a part of IoT paradigm in the near expectations, providing massive applications ranging from home automation, smart environment, health care, etc. Naming and addressing scheme introduced for the communication sensing. The data can treat by giving it a name. To store and retrieve the data names are used. In this paper, we study the NDN in the perspective of smart city communications.
Keywords: Naming, IoT, Smart city, Cross-layer, Sensing

I. INTRODUCTION

IoT networks consist of a huge number of wireless nodes are accountable for sensing, processing and monitoring environmental data [2]. The sensor nodes such as temperature, pressure, position, flow, humidity, vibration, force and motion to monitor the real world [3] collect the environmental data. Some of the sensing technologies are present such as compressed sensing, distributed sensing, optimal routing, priority based sensing, energy efficient sensing.

The objective of the paper is data transfer in the IoT environment should be secure. The security provided by using the communication sensing. Apart from the benefits of IoT, there are quite a few security and privacy issues at different behaviour.

Rest of the paper organized as follows: section 2 gives a smart-city in communication sensing technologies. Communication sensing architecture is described in section 3. Section 4 contains the challenges occurred in the communication sensing in the smart-city IoT environment. The section 5 contains the implementation part and section 6 is the conclusion of the paper.

II. SMART CITY

According to Pike Research on Smart Cities, in 2020 hundreds of billion dollars are estimated with an annual spending reaching nearly 16 billion. This market springs from the synergic interconnection of key industry and service sectors, such as Smart Governance, Smart Mobility, Smart Utilities, Smart Buildings, and Smart Environment. On the other hand, the Smart City market has not really taken off yet, for a number of political, technical and financial barriers [4]. The communication sensing applied to the smart city for securing the data in the IoT environment. Communication sensing is the data transfer to know whether the node is present or not. In the smart city scenario, the data transfer takes place between the nodes. The Smart Buildings, Smart Governance, Smart Mobility, Smart utilities, Smart Environment are having the multiple nodes; these nodes transfer data between them. In this scenario the communication sensing is used for the data transfer whether the node is present or not.

Communication sensing in the smart city with different scenarios:

Structural Health of Buildings: Proper maintenance of the historical buildings of a city requires the continuous monitoring of the actual conditions of each building and identification of the areas that are most subject to the impact of external agents. The IoT may provide a distributed database of building structural integrity measurements, collected by suitable sensors located in the buildings, such as vibration and deformation sensors to monitor the building stress, atmospheric agent sensors in the surrounding areas to monitor pollution levels, and temperature and humidity sensors to have a complete characterization of the environmental conditions [5]. In this scenario the sensors collects the data and store it in the database. When the data is transferred from the one to another, the communication sensing is applied to know whether the data is alive or not.

***Waste Management*:** Smart waste management service, multiple devices are connected in IoT, i.e., intelligent waste containers, to a control centre where an optimization software processes the data and determines the optimal management of the collector truck fleet [6]. When the multiple devices with the sensors are connected to each other the data transfer is takes place, here sensing is used to check the node is present or not.

Traffic congestion: The IoT enabled Smart City services consists of monitoring the traffic congestion in the city. Although camera-based traffic monitoring systems are by now accessible and deployed in many cities, low-power widespread communication can provide a denser source of information. Traffic Monitoring may be realized by using the sensing capabilities and GPS installed on modern vehicles. For the city authorities and citizens this is the great information to discipline traffic and to plan for latter in advance to reach the office in the city centre [7].

***Smart Parking*:** The smart sensors and intelligent displays are used for the smart parking services and it shows the best path for parking in the city [8]. The communication sensing is used to sense the node to transfer data about the parking in the city from the multiple sensor nodes.

III. COMMUNICATION SENSING ARCHICTURE

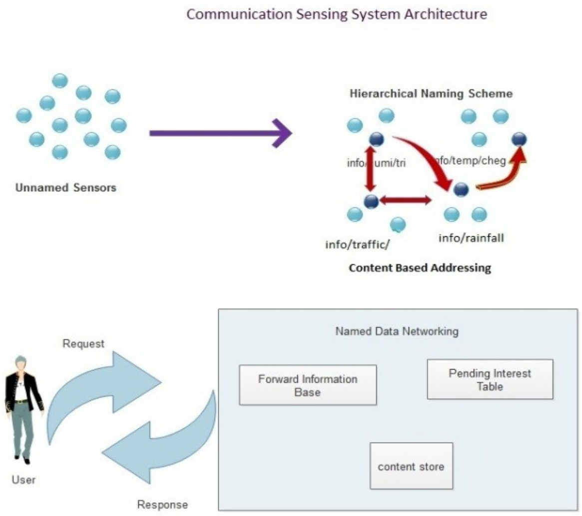

Figure 1. Communication Sensing Architecture

Fig.1 depicts the IoT communication technologies connect heterogeneous objects together to deliver specific smart services. Typically, the IoT nodes should operate using low power in the presence of lossy and noisy communication links. In smart city environment, there are collections of sensors, which are unnamed. The named networking is introduced. The unnamed sensors are named by using the hierarchical naming scheme. The group of sensors in the same domain is collected together and form like a cluster, by default one node can be an addressing node it can be done by using the content-based addressing algorithm. The sensor name can be done by using their task. Naming for sensors is used to store and retrieve the data easily. The two packets are used in the named networking they are data packet and the interest packet. The data packet is used to send the data and the interest packet is used to send request for a data. The request response architecture is used in this network. The network consist of the three tables first one is the forwarding information base which is used to forward the packets, the second one is the content interest store which is used to store the sensor information and third one is the pending table which is used to store pending interest packets. The named networking architecture works, when the user gives request to the network for a data the sensor search for a data in the content base if the data is available it response to the user by forwarding it. If the data is not available in the content store, the sensor gives request to the other sensors whether the any sensor having that data, if any sensors have that data it will be forwarded to the user. Otherwise the request of the user will be stored in the pending interest table until the data forwarded to the user.

IV. CHALLENGES

The main challenges for implementation of communication sensing in IoT are below:

- Huge volume of sensors with varied types and distributed sites need to be connected, managed and maintained
- Designing an accurate sensing algorithm for IoT networks
- Designing proper modulation and coding techniques for IoT systems
- Designing an integral component enabling information sensing over high traffic demand and low latency
- Designing a cross-layer (PHY, MAC and Networking layers) optimization framework to provide seamless, anywhere and anytime network connectivity
- Designing a real time implementation using software-defined radio (SDR) platforms and sensors for IoT network

V. IMPLEMENTATION METHODS

Some of the methods to implement the communication sensing listed below:

- Cooja simulator used to simulate the IoT application. Cooja is a Contiki network emulator.
- NS2 simulator can be used for simulating the naming of sensor nodes and sensing.
- MAT lab, which gives the output in the mathematical graphical format.
- Java programming, the Net Beans software used to implement.

VI. CONCLUSION

The emerging idea of the Internet of Things (IoT) is rapidly finding its path throughout our modern life, aiming to improve the quality of life by connecting many smart devices, technologies, and applications. Overall, the IoT would allow for the automation of everything around us. This paper presents an overview of the premise of sensing concepts, emerging technologies in the communication sensing, data transfer with security, naming and addressing schemes are used to store and retrieve the data. In future, we would investigate on sensing algorithms for various IoT applications.

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