Wireless sensor network applications in monitoring and control of gas networks

Sajad Balali Dehkordi[1], Farshid Soheili [2], Hamidreza Ebrahimi[3], Amin Afzalian[4]

1- Department of Electrical Engineering Islamic Azad University of Majlesi city.
Email: Sajjaddehkordi@yahoo.com (Corresponding author)
2- Department of Electrical Engineering Islamic Azad University of Majlesi city.
Email: Farsh.s@gmail.com
3- Department of Electrical Engineering Islamic Azad University of Majlesi city.
Email: Rxrd@gmail.com
4- Department of Electrical Engineering Islamic Azad University of Majlesi city.
Email: aminafzalian@yahoo.com

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ABSTRACT:
Traditional database systems provide communication between humans and however wsn communication with the physical world. System performance monitoring and remote reading of gas stations and the expansion of the transmission networks and gas distribution,change in gas prices and the need to measure and manage the accurate measurement of gas consumption growth in provincial gas companies . Needs of provincial gas companies due to the design and interpretation of remote monitoring system. Design and implementation of monitoring systems for gas stations, data aggregation under the standard protocol,monitored to ensure accuracy of information, using knowledge to implement this system in the country, lead to avoid a using trial and error method. Since the communication system is achievable using software relocation of a large system, Many major industries such as oil & gas, petrochemical, power generation, chemical industry and ... Without proper monitoring systems are not able to continue his work. In this simulation, pressure transmitters, flow and temperature are collected by a wireless network by monitoring software to monitor and control equipment in the control room will be implemented.
KEYWORDS: industrial automation, communication protocols, wireless sensor networks.

1. INTRODUCTION

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. (Fig.1)

- IEEE 802.15.4 compliant radio
- 2.4 GHz band using DSSS at 250 kbps
- Integrated voltage regulator
- Integrated digital baseband and MAC functions

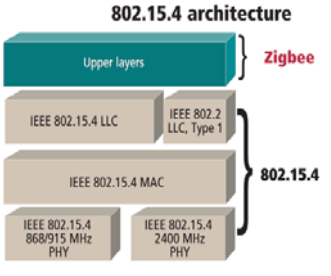

Fig1: architecture 802.15.4

2. DESIGN OF WIRELESS COMMUNICATION NETWORKS

Run the system for monitoring and interpretation of remote gas stations due to the extensive network of transmission and distribution of gas, change gas prices due to the design of subsidies and a need to measure and manage accurate gas consumption, including the requirements of gas companies in Alberta

The general acceptance of provincial gas companies adopt different methods of monitoring systems and the read distance is Including the cost of deploying SCADA systems named.

Designing a wireless network in terms of accuracy and knowledge of design is different from others.

Designed to achieve the highest performance at a reasonable price monitoring effort.[2]

The most important step in determining the overall strategy is to design a wireless communication network.

Automation system that will use the network should be established to investigate and objectives of the network.

Monitoring system is designed for large cycle.

In a series of internal and external characteristics are presented.

Interior features include a set of network components and their performance and build network models.
External features include user viewing angles when the network will be used.
The main issues in designing a system that should be considered include: cost, performance, reliability and availability, service or network performance, environmental tolerance, by transfer, capacity development, maintenance and security. [1]

1-COST
Cost of the network implementation is divided into two primary costs. Initial costs include:
Purchased software, hardware, design, installation and start and administrative costs, hardware and software maintenance, network troubleshooting and expenses paid, and the development of the network.

2- Performance
Good performance in a network is essential for its activity without disrupting normal communication and control is the process of applying constant calculated
And circuit board production is difficult in an effective program should have at least an estimate of the executive demands.

Network load and speed are the main factors in the analysis of network performance. Analysis and identification of network applications and determine the function of traffic and communication are important. (Fig.2)

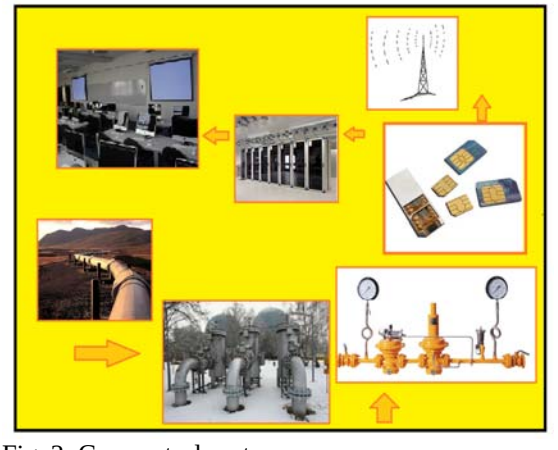

Fig. 2: Gas control system

2-1 - Protocol for wireless sensor networks
Sensor network protocol consists of five horizontal layers, physical layer, data link, network, transport and application layer with vertical and lateral power management, transportation management and task management is.
Physical layer modulation and send and receive operations of its task is low.
Media access control layer should be able to minimize accidents by neighboring nodes to communicate with each broadcast. Network layer and the transport layer is the task of routing data that is responsible.
The transport layer packet flow management task if applicable, is responsible.
Depending on what network it was designed for a variety of software applications can be used on the application layer and provide various services.
Vertical layers of management with involvement in all horizontal layers determines how power the node.
In order to reduce the energy consumption of the algorithms and protocols need to be aware of.
For example, a node that receives a message from one of its neighbors after receiving his silence prevent and reduce the energy consumption of the received messages is again
This is another idea that can be used as a node that has the lowest energy
Public announcement that her neighbor's energy is being completed and can not be involved in the routing messages.
Neighboring nodes, then the message will be routed through other nodes.
Vertical layer mobility management, location-aware techniques to be applied to the detection and registration will Node
The management is always a path back to the user and the mobile node rule is followed.
Task scheduling and task management nodes balances.
For example, if you feel the task was assigned to a specific area where all the sensor nodes do not need to operate simultaneously feeling
But this task can be used depending on the reliability of nodes, such as nodes are assigned more or less traffic and have more energy. This algorithm should be used to ensure the detective
However the above, nodes in sensor networks can be efficient methods
Working together and moving data in a sensor network routing, and resource sharing between nodes. (Fig.3)

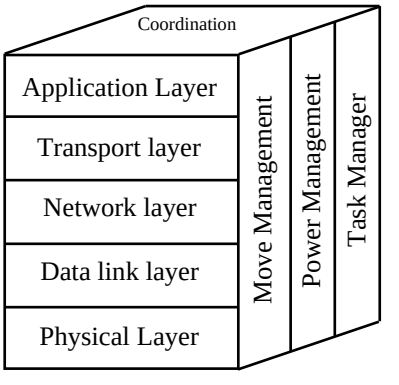

Fig3: Sensor network protocols. [3]

2. UNFORESEEN FACTORS

A sensor network operate is subject to a number of uncertainties.

natural factors such as floods, earthquakes are unpredictable, the problems of wireless communication and radio disturbances, allowing each node failures, lack of calibration of sensors, dynamic structure and routing network, adding new nodes and old nodes are removed, move the nodes or controlled by natural factors **...**[4]

3. ROUTING TECHNIQUES IN SENSOR NETWORKS

Since data collection in sensor networks where energy consumption must be optimally effective, one of the critical issues in the operation of the sensor network lifetime can be considered

send and receive data between the nodes and the energy consuming, so it should be used in ways that reduce energy consumption, it is possible. however, the criteria such as energy, bandwidth, memory, scalability, and real-time communication. . .compromises must be made.

first, to describe this process, we will execute a query in sensor networks

after reviewing the existing structures of the classification and comparison of delivery methods for spreading and disseminating data in wireless sensor networks**.** (Fig.4)

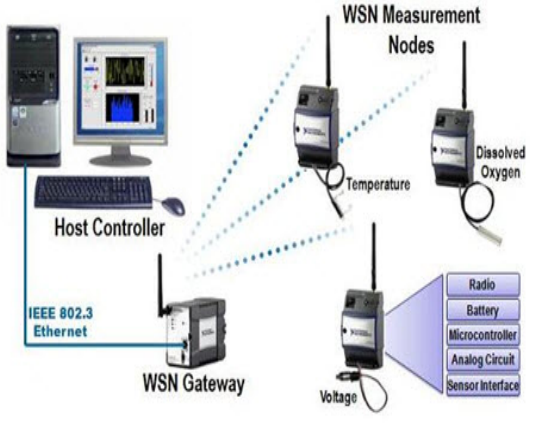

Fig4:Control Architecture [5]

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