Research aspects and Need of Data Compression in Wireless Sensor Network

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ABSTRACT - In this paper we have evaluated and studied numerous data compression requirement in WSN with respect to communication processing, routing, and quality of service, scalability, reliability and security and future aspects of research.

I. INTRODUCTION

The rapid growth in communication technology has resulted in many promising and innovative technologies. Wireless Sensor Networks (WSN) is one from these technologies. In wireless sensor network various sensors are established in physical environment for physically sense the phenomena like sound, temperature, light, humidity etc [1]. Usually, sensor nodes are tiny units which have of following components: a sensor to sense the data, a computing unit to compute and storage unit, to store data a wireless communication media for transmitting the data, a small power unit a battery for power supply basically this battery is a small power unit which have limited energy, because due to deployed in hostile environment, in most of cases, it could be not possible to recharge these batteries or replace these batteries [2]. In some cases solar units are used with sensor nodes to recharge the batteries [3]. Numerous previous studies have shown that maximum energy is consumed at the time of data transmission and related process [4]. So the energy-saving techniques and related issues are focusing on data sensing techniques and transmissions are major concern issue of research [5].

II. REQUIREMENT OF DATA COMPRESSION IN WSN

Today Wireless Sensor Networks are utilized in a large variety of applications, which show to a various series of necessities for compression techniques. For example, task significant applications, like fire rescue, battlefield, and health monitoring. Further WSN is classified into various categories.

(i)   Generic Requirement
(ii)   Application Specific.

Generic Requirements: These parts summarize the generic necessity for compression in WSN's.

Processing Complexity and Memory necessities: Normally, in WSN, nodes are prepared with restricted computation and memory ability. Due to these restrictions, it's important to plan light weight code (small in size) data compression techniques for WSN applications. With these restrictions, compression techniques are difficult to execute in sensor networks [6] [7] [8].alteration in records existing at base station. Allowing for this, classify the necessities of compression in wireless sensor network in two behaviors:

Communication Necessities: While radio transmission utilizes a major quantity of sensor node power [8] [9], compression techniques are normally designed to reduce or decrease the duplicate data replace among sensor nodes. This means more computing and less transmission. Therefore, compression schemes can be used to reduce transmission expenditure of base station and sensor node.

Redundant Sensing: In a few cases, the sensing exposure of sensor nodes may be related, most important to the achievement, transmission, and redundant data storage, maybe reproductive data.

On-Route Compression: At transitional sensor nodes used for while traveling in network processing or revolution, for instance, used for data gathering or trans coding. On-route compression schemes may be mainly efficient for heterogeneous sensor networks consisting of dissimilar kind of sensor nodes.

Reliability: In Wireless Sensor Network it has two characteristics: data reliability and communication [10]. Data reliability use to enhance by utilizes spatial redundancy in sensor capacity. Communication reliability is use enhance through exploiting capacity redundancy or via accumulation error checking bits.

Robustness: Compression schemes in sensor network require being robust sufficient to effort appropriately still if there be a collapse. To accept node and connection collapse, duplicate deployment is essential, which clearly clash with one of key constraints in compression. Intended for robustness, require trustworthy transportation or trustworthy topology or else both, thus a transaction among robustness as well as power effectiveness in sensor networks might be desirable

Scalability: Wireless sensor network applications variety from a small number of sensor units to huge numbers of sensor units. Thus, compression schemes have to extent with sensor network dimension.

Application-Specific Requirements: Wireless Sensor Networks have extremely assorted applications with varied necessities. In following, we describe in a few words, these

assorted and application particular necessities.

Real Time and Non-Real-Time: Wireless sensor network applications that give real time client data or organize results, for example as in healthcare applications or intelligent transportation systems, need restricted latency. Non real time data compression permits data computing from more than a few sampling phases in a single group and send in-bulk. This can considerably enhance compression ratio.

QoS-Awareness: Quality of service/ quality of information metrics in Wireless Sensor Networks contain timeliness, trustworthiness, and alteration. The relative significance of this phase of quality of service [11] is application reliant.

Security: Most wireless sensor network applications need a definite amount of security. Therefore, compression and security protocols may be re designed thus the compression can be performing with no sacrifice security.
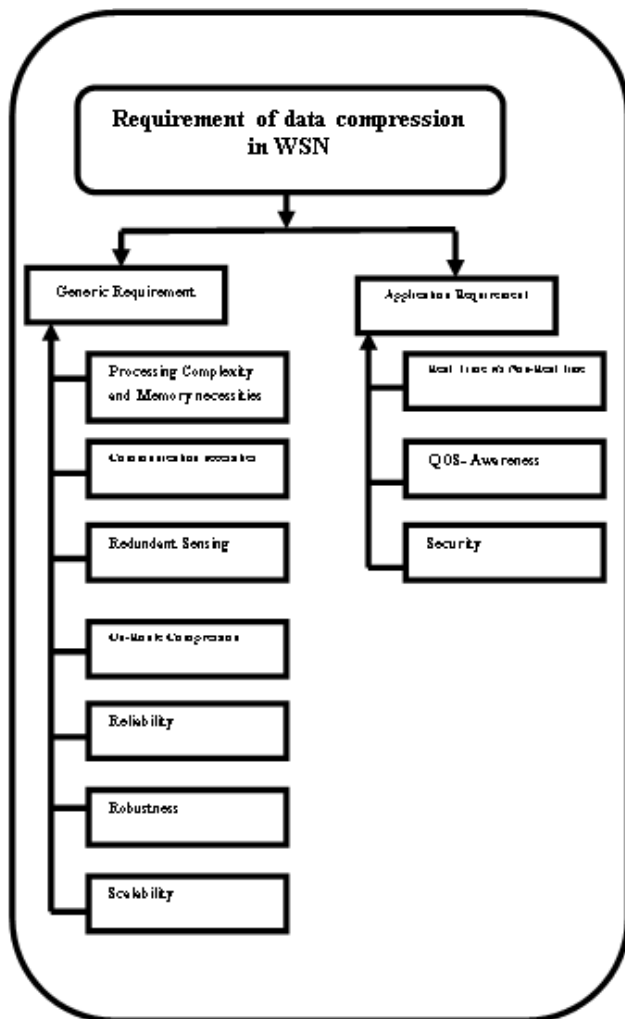

Figure-1.5: Requirement of Data Compression in WSN

III.   RESEARCH ASPECTS OF DATA COMPRESSION IN WSN

Wireless sensor network has limited impact on complete networks due to concern of energy constraints. Power is a significant constraint in design of Wireless Sensor Networks. Due to limited energy and communication ability, the communicated data packet should be little in size.

The sensed data require to be compressed with data compression scheme that can manage energy utilization by converting a large data into a small data. Although there are a lot of well-organized compression algorithms to compress the data, however yet there is necessitate of improvement in power efficient data compression schemes. Obviously, the method of collecting the data and compressing the data use much energy and hence required to be optimized. And raises research problems i.e. whether the valuable sensed data is able to acquire straightforwardly? Or whether altering the conventional data gathering procedures are efficient and feasible? The compressed data provide us another way to solve these troubles. This work survey power utilization trade-offs related with compression. This compression scheme enhances the lifespan of wireless sensor network. Furthermore when data gathered is compressed and transmitted from the sensor network, it occupies less bandwidth. This besides minimizes the amount of communication power expended by sensor nodes. So data collection safe transmitting and energy saving is measured as a very difficult and challenging problem in sensor network. Moreover very few researchers have done significant research in the field of data compression in WSN and especially in case of RLE based algorithm.

IV.   CONCLUSION AND FUTURE WORK

The above studied on data communication in wireless sensor network is to be optimize the services through data compression. The power management is main issue which requires to be accomplished. Thus, a well-organized data compression technique be able to minimize significantly wasted power subsequently reducing the node energy cost and getting more dependability and scalability.

In the future research work, mainly a technique to compress the data of sensor network needed which is able to reduce the power utilization of sensor nodes and ensuing in overcome the other difficulties of data communication in wireless sensor network.

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