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Analysis on Cross-Layer Communication protocol stack for IOT Network

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ABSTRACT

IOT have been used to gather data and information in many diverse application settings. The capacity of such networks remains a primary obstacle toward the alteration of sensor network systems for advanced applications that require higher data rates and throughput . Many integrated cross-layer protocol are proposed which provides communication mechanisms for sensor network to fully utilize frequency channels, to improve the process flow and time slot scheduling for the cluster nodes. But across-layer protocol that contains a full set of communication mechanisms for IoT applications is still in research. This paper analyzes the various existing communication protocols in sensor networks and their working mechanism. In an overview we present the research challenges and issues in implementing a cross-layer communication protocol stack for IOT network.

Keyword : DPSMC, Data Rates, Throughput, Sectored Channels.

I. INTRODUCTION

IOT have been used to WSN as gathering information for many diverse applications. The main goal of DPSMC protocol is to increase the throughput and to decrease end-to-end delay. The header node sends the request to the base station and the base station has the multiple data flows. Here using the RTS/CTS concept between the nodes, because nodes may be a loss of sensory data, packet drops, and poor network performance. The usage of control packets like RTS/CTS may abate the interference problem, however, they inhibit a large neighboring in all directions from transmitting simultaneously, which again degrades the performance and limits the wireless network capacity. Uncertainty or possibility, the most famous advantage is the decreases of interference between neighboring nodes, which increases the spatial reuse of the network and improve the network performance. We already saw a lot of theoretical analysis in routing protocol so we have the working flow of DPSMC [1].

In this paper, we investigate on the performance of various communication protocols for cross-layer interaction in IoT network. Any communication protocol should provide the following two objectives:

1. Increases the throughput and decrease delay.
2. Guaranteed delivery of packets and avoid packet loss.

The paper is designed as follows: section II is literature survey, section III is Existing System and Methodologies, section IV will show the Analysis and Discussion and finally the conclusion in section V.

II. METHODS AND MATERIAL

1. Literature Survey

In 2010 Tommaso Melodia, Member, IEEE, and Ian F. Akyildiz, Fellow, IEEE[1],In this paper explain about the wireless multimedia sensor networks(WMSNs) are disseminated systems of wirelessly networked devices that allows retrieve video and audio streams, at rest images, and scalar sensor data. To enable these applications, WMSNs require the sensor network protocol to be re-thought in view of the need for mechanisms to deliver multimedia content with a pre-defined level of quality of service (QoS).Here use the

new cross-layer communication architecture based on the time synchronization is described, who objective is to reliably and flexibly. But this paper has the high delay and high jitter performance.

In 2010 Rully Adrian Santosa, Bu-Sung Lee, Chai Kiat Yeo and Teck Meng Lim [2], in this paper propose a disseminated neighbor detection algorithm in ad hoc network directional channel. A newly joining node obtains the information about its neighbours in in both its omnidirectional and directional range by querying a subset of its omnidirectional neighbours. This paper said the, we improve our performance in dynamic network condition algorithm, where nodes join and leave the system dynamically.

In 2011Jun-BaeSeo, Student Member, IEEE, and Victor C. M. Leung, Fellow, IEEE[3], Here using conflict resolution algorithms for immediate and deferred first-transmission protocols in a multi-packet reception slotted ALOHA system based on signs partition various access. We have throughput efficient cross-layer CRAs for IFT and DFT protocols in CDMA-based MPR S-ALOHA systems, in which MAI is exploited to approximation the system backlog in the presence of power control errors. Here have the problem on a distributed backlog estimation algorithm for MPR channel will be developed.

In 2013 J.J. Garcia-Luna-Acevesy and Chane L. Fullmerz[4], In this paper explained about the Floor Acquisition Multiple Access Protocol as guarantees that a single sender to send data without any collisions to a given receiver at any given time. FAMA is based on the three-way handshake between the sender and receiver. The sender used to send a request-to-send (RTS) and the receiver send a clear –to-send (CTS) that lasts much longer than the RTS to serve as a "active tone" that forces all secret nodes to back off long enough to allow a collision-free data packet to get there at the receiver. Floor acquisition multiple access protocol in the presence of hidden terminals problem.

2. Existing methodologies

Much effective protocols can be used to the many project but here we are used Distributed Packet Scheduling Multiple Access Protocol (DPSMC). There have many content based Mac protocol such as ALOHA,FAMA(Floor Acquisition Multiple Access Protocol), BTMA (Busy Tone Multiple Access Protocol) and content based protocol with reservation mechanisms such as D-PRMA (Distributed Packet Reservation Multiple Access Protocol), CATA(Collision Avoidance Time Allocation Protocol), SRMA/PA(Soft Reservation Multiple Access with priority Assignment).

a) ALOHA:

ALOHA requires a method of handling collisions that occur when two or more systems attempt to transmit on the channel at the same time [3]. In the ALOHA system, a node transmits whenever data is available to send. If another node transmits at the same time, a collision occurs, and the frames that were transmitted are lost. However, a node can listen to broadcasts on the medium, even its own, and determine whether the frames were transmitted.

b) FAMA:

FAMA stands for Floor Acquisition Multiple Access Protocol. As guarantees that a single sender to send data without any collision to a given receiver at any given time. FAMA is based on the three-way handshake between the sender and receiver [4]. The sender used to send a request-to-send (RTS) and the receiver send a clear –to-send (CTS) that lasts much longer than the RTS to serve as a "active tone" that forces all secret nodes to back off long enough to allow a collision-free data packet to get there at the receiver. Floor acquisition multiple access protocol in the presence of hidden terminals problem [4].

c) BTMA:

Busy tone multiple access protocols have been used in multi hop networks to shrink the effect of the hidden terminal problem. Due to difficulty, the performance of these protocols for large networks has not been analyzed [10]. The transmission channel is divided into two channels: a data channel and a control channel.

d) **D-PRMA:**

D-PRMA stands for Distributed-Packet Reservation Multiple Access Protocol. It extends the earlier Centralized Packet Reservation Multiple Access(C-PRMA).D-PRMA is a TDMA-based scheme [10]. The

channel is divided into fixed and equal-sized frames along the time axis. Each frame is composed of s slots, and each slot consists of m mini slot. D-PRMA is more suitable for voice traffic than for data traffic applications.

e) **CATA:**

CATA stands for Collision Avoidance Time Allocation Protocol. CATA support broadcast, unicast, and multicast transmissions simultaneously. Time is divided into equal-sized frames consists of s slot. Each slot is divided into five mini-slots. CATA works well with single-channel half-duplex radios. It is simple and provides support for collision-free broadcast and multicast traffic [9].

III. RESULTS AND DISCUSSION

Table 1. Existing MAC protocols

MAC Protocol	Protocol	Abbreviation	Collision avoidance scheme
Contention-Based MAC protocol	FAMA	Floor Acquisition Multiple Access Protocol	Waiting period on nodes
Contention-Based MAC protocol	BTMA	Busy Tone Multiple Access Protocol	Busy tone
Contention-Based MAC protocol with Reservation Mechanisms	CATA	Collision Avoidance Time Allocation Protocol	Reserved Time slots
Contention-Based MAC protocol with Reservation Mechanis--ms	D-PRMA	Distributed Packet Reservation Multiple Access Protocol	Busy indicators Reservation status
Contention-Based MAC protocol	SAMAC	Sectored-Antenna Medium Access Control	Time slots for cluster

Research Issues

Many Distributed Packet Scheduling Multiple Access protocols are designed as an integrated cross-layer protocol that consists of different communication functionalities that allow high utilization of sectored channels. In sectored channel must choose the proper sectors to point to each other during the communication session[10]. Otherwise, the receiving node cannot receive the message due to weak reception power. Using the sensor network that is separated a priori into cluster that is served by predetermined set of high capability sink nodes. Within the cluster, the topology is flat over multiple hops [4]. Many communication protocols describe all the network nodes as a single cluster. The cluster have the sink node (i.e. header node), it will be transfer the all the data to the cluster or base station [10].The sink nodes have the special performance when compare to the other nodes, it's a header node of the cluster. If the sink node fails, the entire cluster is considered to be unreachable in the network. All these issues are open for research initiation for IoT applications.

IV. CONCLUSION

In recent years, there is the rapid growth in the field of IOT which increases the capacity of protocols. Here DPSMC protocol is an integrated cross-layer protocol that contains a full set of communication mechanisms for sensor network equipped with the sectored channel. From this research paper there are many protocols but those protocols have some drawbacks by using this protocol there is no disadvantages and the performance is improved. In future we can study protocol in more detail and design various modules which provide more accurate presentation and to minimize the work.

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